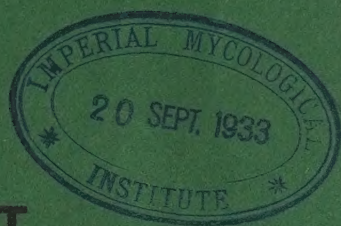


UGANDA PROTECTORATE.



ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR THE

YEAR ENDED 31ST DECEMBER, 1932.

(PART I).

PRICE : SHS. 3.

Published by Command of His Excellency the Governor.



ENTEBBE:

PRINTED BY THE GOVERNMENT PRINTER, UGANDA.

1933.

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DEPARTMENT OF AGRICULTURE.

ANNUAL REPORT, 1932.

(PART I).

Addresses of Officers and Telephone Numbers :

						<i>P.O. Box</i> <i>No.</i>	<i>Telephone</i> <i>No.</i>
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HEAD OFFICE	...	...	...	Entebbe	..	2	91
SENIOR AGRICULTURAL OFFICER	...	...	...	Kampala	...	281	15
AGRICULTURAL LABORATORIES AND KAMPALA PLANTATION,				Kampala	...	265	18
BOTANIC GARDENS	...	...	...	Entebbe	...	60	38
JINJA OFFICE	...	...	...	Jinja	...	67	101-105

PRINCIPAL EXPERIMENT STATIONS :

- (1) Kampala. (2) Serere, Teso. (3) Bukalasa, Mengo.
(4) Bugusege, Bugishu. (5) The Botanic Gardens, Entebbe.

SUBSIDIARY STATIONS :

- (1) Ngetta, Lango. (3) Wanyange, Busoga.
(2) Kamuge, Bugwere. (4) Kakumiro, Mubende.

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STAFF LIST.

<i>Director of Agriculture</i>	J. D. TOTHILL, D.SC. (HARVARD), B.SC. (TORONTO).
<i>Deputy Director of Agriculture</i>	G. F. CLAY, M.C., B.SC. (EDIN.), N.D.A., N.D.D. (HONS.).
<i>Statistician</i>	H. G. SMITH.
<i>Office Superintendent</i>	G. A. READ (to 31st March).
<i>Clerk</i>	A. J. DOWSE.

GENERAL DIVISION.

<i>Senior Agricultural Officers</i>	A. B. KILLICK, B.SC. (LOND.), DIP. AGRIC. (WYE). C. E. J. BIGGS, B.SC. (LOND.), DIP. AGRIC. (WYE).
<i>Superintendent of Agricultural Education</i>	E. G. STAPLES, M.A., M.R.A.C., DIP. AGRIC. (CANTAB.).
<i>Agricultural Officers</i>	R. T. WICKHAM. D. STEDMAN-DAVIES, B.SC. (WALES). N. S. HAIG, B.SC. (LOND.), DIP. AGRIC. (WYE). E. F. MARTIN, DIP. AGRIC. (HARPER ADAMS AND NORTHANTS) W. T. O. MAIDMENT, B.A. (CANTAB.). H. L. G. MILNE, N.D.A. A. J. KERR, B.A. (CANTAB.), A.I.C.T.A. R. P. DAVIDSON, B.SC. (EDIN.), N.D.A. W. J. M. IRVING, B.SC. (EDIN.) J. D. JAMESON, B.A. (OXON.), A.I.C.T.A. W. J. BADCOCK, DIP. AGRIC. (READING), N.D.A. T. R. HAYES, B.SC., A.I.C.T.A. (from 24th March).
<i>Agricultural Officers (Education)</i>	C. W. L. FISHLOCK, B.SC. (LOND.), B.SC. (READING), A.I.C.T.A. R. W. STUCKEY, M.A. (CANTAB.), B.S.A. (MCGILL), A.I.C.T.A. M. G. DE COURCY-IRELAND, B.A. (CANTAB.)
<i>Coffee Officer</i>	W. L. MUNN (to 31st August).
<i>Tobacco Officer</i>	G. T. PHILPOTT.
<i>Cotton Grader and Ginning Inspector</i> ..	MAJOR N. G. WRIGHT (to 14th July).
<i>Plantation Managers :—</i>	
CAPT. J. S. HARMSWORTH, M.C. (to 5th November).	E. A. RUCK.
C. HAZEL.	A. L. STEPHENS.
P. CHANDLER.	
<i>Ploughing Instructors :—</i>	
J. K. SHEPHERD.	W. GRAY.

AGRICULTURAL LABORATORIES.

<i>Government Entomologist</i>	H. HARGREAVES, A.R.C.S., D.I.C., F.E.S.
<i>Entomologist</i>	G. H. E. HOPKINS, M.A. (CANTAB.), F.E.S.
<i>Mycologist</i>	C. G. HANSFORD, M.A. (CANTAB.), F.L.S.
<i>Senior Botanist</i>	G. W. NYE, B.SC. (LOND.), DIP. AGRIC. (WYE).
<i>Agricultural Chemist</i>	W. S. MARTIN, PH.D., M.SC. (LOND.), A.R.C.S., D.I.C., A.I.C.
<i>Assistant Entomologist</i>	G. L. R. HANCOCK, M.A. (CANTAB.), F.E.S.
<i>Assistant Agricultural Chemist</i>	G. GRIFFITH, PH.D., B.SC. (WALES), A.I.C.T.A.
<i>Assistant Botanists</i>	H. R. HOSKING, B.SC. (LOND.), A.R.C.S., A.I.C.T.A. A. S. THOMAS, B.SC. (HORT.), (LOND.), M.SC. (READING), A.I.C.T.A. (from 28th January).
<i>Laboratory Apprentice</i>	T. W. CHORLEY.

CLERICAL STAFF.

<i>Clerks :—</i>	
J. C. S. DE SOUZA.	M. A. S. MENEZES.
A. S. REMEDIOS.	F. C. DE SOUSA.

DEPARTMENT OF AGRICULTURE.

ANNUAL REPORT

FOR THE YEAR ENDED 31ST DECEMBER, 1932.

PART I.

1. This Report is divided into two parts :—Part I. deals with the administrative side of the departmental activities and gives a review of the agricultural position of the Protectorate during the year, and Part II. contains a report on the scientific work and results of experiments conducted during the year.

Staff.

2. The following were the principal staff movements and changes during the year :—

MR. D. STEDMAN-DAVIES, Agricultural Officer, acted as Senior Agricultural Officer from 16th May until the end of the year.

MR. H. R. HOSKING, Assistant Botanist, acted as Senior Botanist from 15th April until 25th November, 1932.

The titles of Cotton Botanist and Assistant Cotton Botanist were changed to Senior Botanist and Assistant Botanist respectively.

MR. T. R. HAYES, Agricultural Officer, was appointed 24th March, 1932, on transfer from the Gambia.

MR. A. S. THOMAS, Assistant Botanist, was appointed 28th January, 1932, on transfer from the Gold Coast.

MR. G. H. E. HOPKINS, Entomologist, and MR. T. W. CHORLEY, Laboratory Apprentice, were transferred to this Department from the Medical Department.

MR. E. G. GIBBINS, Laboratory Assistant, resumed duty with the Medical Department.

MR. J. D. JAMESON, Agricultural Officer, assumed duty in August.

The following officers were absent on home leave from the Protectorate during the year :—

MR. R. T. WICKHAM, Agricultural Officer.

CAPT. J. S. HARMSWORTH, M.C., Plantation Manager.

MR. E. A. RUCK, Plantation Manager.

MR. A. L. STEPHENS, Plantation Manager.

MR. J. K. SHEPHERD, Ploughing Instructor.

MR. C. W. L. FISHLOCK, Agricultural Officer.

MR. R. W. STUCKEY, Agricultural Officer.

MR. G. T. PHILPOTT, Tobacco Officer.

MR. C. G. HANSFORD, Mycologist.

MR. G. W. NYE, Senior Botanist.

DR. W. S. MARTIN, Agricultural Chemist.

MR. T. W. CHORLEY, Laboratory Apprentice.

MR. C. E. J. BIGGS, Senior Agricultural Officer.

CAPT. J. S. HARMSWORTH, M.C., Plantation Manager, retired on pension on abolition of office, after eighteen years of service.

MAJOR N. G. WRIGHT, Cotton Grader and Ginning Inspector, and MR. W. L. MUNN, Coffee Officer, were retrenched on abolition of offices. Mr. Munn secured a post with the Native Administration in connection with the Bugishu Coffee Scheme.

MR. G. A. READ, Office Superintendent, was transferred to the Police Department on abolition of office.

3. I wish to record my appreciation of the loyal services rendered by all members of the staff during the year and to express my sense of appreciation for the large measure of assistance that has been rendered, not only by my colleagues in other departments of the service, but by many unofficial members of the community, particularly those who have so willingly served on Committees of various kinds at no little inconvenience to themselves.

General.

4. It is satisfactory to be able to report that three agricultural records for Uganda have been broken during the year under review. The first is the export figure for groundnuts which reached 1,455 tons; this is only a slight advance over the previous record for 1930 of 1,289 tons, but may indicate that production for export is beginning to expand. The next is that the value of coffee exported reached the figure of £223,162 as against the previous record of £177,135 in 1929; this means that native production of this commodity is increasing at a satisfactory rate. Finally, and perhaps most important, the acreage under cotton reached 1,071,410 acres, as against the previous record of 865,259 acres.

The rainfall during the year in most parts was slightly above normal.

A marked feature was the rather prolonged dry period in the middle of the year in Buganda and Western Provinces. In Buganda a large acreage of cotton is generally planted in July, which is normally one of the best planting months. As the July rains failed, however, unusually large acreages were planted in August and particularly September. Cotton planted as late as September frequently fails owing to unfavourable weather in the following two months. This year, however, weather was favourable, and at the end of the year there is a prospect of good yields from these late plantings.

Weather conditions in general were favourable to the growth of all crops.

Locusts.

5. Although locusts were reported from most parts of the Protectorate throughout the year, the swarms were fewer in number and smaller in size than in the previous year, and the damage to crops from this pest was negligible. This satisfactory position was probably due in part to the fact that natives in bulo areas responded well to the Administration's efforts to have large areas of locust-resistant food crops planted.

Notes on the Major Economic Crops.

COTTON.

6. (a) *1931-32 Crop.*—The cotton buying season opened on the 25th January in all areas.

In the early stages the indications pointed to a yield well above the average. Towards the end of 1931, however, weather became unfavourable and the crop estimate had to be reduced to allow for a modest yield only.

The total amount of seed cotton purchased during the buying season amounted to 116,231 tons, equivalent to approximately 195,000 bales, of which the Eastern Province accounted for 61,187 tons, Buganda Province 46,315 tons, and the Northern and Western Provinces 8,729 tons. The actual export of bales exceeded 200,000 for the second time in the history of the crop.

(b) *1932-33 Crop*.—The following table gives details of approximate acreages planted in the various districts together with the comparative figures for the previous crop:—

EASTERN PROVINCE.					1932.	1931.
Busoga District	...	...	...	...	221,271	137,887
Budama	„	...	...	...	64,300	36,827
Bugwere	„	...	...	...	123,530	112,101
Bugishu	„	...	...	...	48,856	47,592
Teso	„	...	...	...	134,481	115,626
TOTAL ACRES					592,438	450,033
BUGANDA PROVINCE.						
Mengo District	...	...	...	...	157,668	145,285
Entebbe	„	...	...	...	86,924	70,349
Masaka	„	...	...	...	33,828	39,090
Mubende	„	...	...	...	39,891	36,941
TOTAL ACRES					318,311	291,665
NORTHERN PROVINCE.						
Lango District	...	...	...	...	83,183	52,483
Bunyoro	„	...	...	...	25,000	16,550
Gulu	„	...	...	...	22,300	26,200
Chua	„	...	...	...	18,000	12,248
West Nile	„	...	...	...	4,200	5,050
TOTAL ACRES					152,683	112,531
WESTERN PROVINCE.						
Toro District	...	...	...	...	5,505	4,847
Ankole	„	...	...	...	2,473	6,183
TOTAL ACRES					7,978	11,030
GRAND TOTAL					1,071,410	865,259

From the above it will be noted that the steady increase in the acreage of the crop has been well maintained and that for the first time the total acreage exceeded one million acres.

Favourable weather conditions enabled a large proportion of the crop to be planted early, and in the Eastern and Northern Provinces over 70 per cent. of the crop had been planted at the end of July.

In Buganda, as already mentioned, there was a considerable increase in the acreage under late planted cotton, 47 per cent. of the crop being planted later than the end of July, as against 38 per cent. in the previous season.

Favourable conditions prevailed throughout the growing season and the condition of the crop at the end of the year warranted an estimate of 275,000 bales of 400 lbs. net.

The area under the variety S.G. 29 was further increased from 55,499 acres in the 1931-32 season to 144,581 acres in the 1932-33 season, comprised of 134,481 acres in Teso district and 10,100 acres in the West Nile—Madi area of the Northern Province.

(c) *Pink Bollworm—Platyedra gossypiella*.—Efforts to retard the spread of Pink Bollworm into the main cotton growing areas of the Protectorate were continued. The export of cotton seed and seed cotton out of the following areas was prohibited:—

(a) West Nile district and East and West Madi divisions of Gulu district.

(b) The remainder of Gulu district as far south as the southern boundary of Minakulu Gombolola.

(c) Chua district.

In this way a barrier was established between the endemic Pink Bollworm areas of the Anglo-Egyptian Sudan and the uninfested areas of this Protectorate. A five-mile no-cotton belt was also established on the boundaries of the Gulu closed area with a view to further retarding the natural spread in the field. As an additional

safeguard, the whole of the cotton seed at all ginneries in the three closed areas was destroyed by burning, and the seed from clean areas was distributed for planting of the 1932-33 crop. So far, entomological investigations have not established the existence of a resting larval stage, and should it be confirmed that under Uganda conditions such a stage does not occur, action against the pest will be simplified.

(d) *Ginneries*.—Ginneries licensed to gin and bale cotton during the year were as follows:—

						Number of Ginneries.
Indian ...	...	...	...	...	...	100
European ...	...	...	...	...	...	18
Japanese ...	...	...	...	...	...	5

a total of 123 as compared with 127 in the previous year.

With a total of 194 recognised ginnery sites on which ginneries have been erected, this means that 71 ginneries were "silent" during the year.

(e) *Cotton Seed*.—During the year 56,311 tons of cotton seed, valued at £168,366, were exported through Mombasa.

With the low lint prices now ruling the export of cotton seed has become of greater importance as it enables a slightly higher price to be paid for seed cotton. It is estimated that at least 60 per cent. of the seed produced is exportable at prices around £2 per ton at railhead, and this represents, roughly, with a 250,000 bale crop, an additional disbursement in the Protectorate of approximately £100,000, or Shs. 2 per acre of cotton.

With the extension of railway communications in the Protectorate during the past six years, there has been a large increase in the area in which cotton seed can be regarded as an economic product. It is only possible to export cotton seed and maize if comparatively low railway rates are charged. Hitherto the railway has been able to maintain very low rates, but owing to the large increase of low rated traffic the Railway Administration has found it necessary to reduce expenditure by carrying this low rated material under non-peak conditions. A monthly allocation system has therefore been inaugurated and certain difficulties have arisen as is inevitable when restrictions have to be placed on traffic movements. The Uganda Cotton Association, however, have undertaken to apportion the allocations among the various ginners, and on the whole, thanks to the excellent work of the Association, hardships have been reduced to a minimum and the system to be introduced as from the 1st January, 1933, seems likely to work smoothly.

(f) During the year, local transactions in baled lint were again numerous, and particulars of 1,891 contracts, representing 220,091 bales, were registered.

It will be seen from these figures that a considerable local lint market has become established and that much of the crop changes hands two and three times prior to export.

As mentioned in the report for 1931, consideration has been given to the question of the introduction of machinery for local arbitration.

During the year an *ad hoc* Cotton Grading Committee met, and as a result of their recommendations it was decided, in regard to the 1932-33 crop, that samples should be prepared in the early part of the buying season which should be representative of the fair average quality of each of the principal cotton areas in the Protectorate, and it is hoped that these samples will be used in 1933 as a basis for arbitration in local transactions.

The samples represent an experiment which it is hoped may lead to compulsory arbitrations based on the annual collections of local samples.

(g) In my report for 1931, I drew attention to some of the effects on agricultural problems besetting the cotton industry arising out of the irrational development of motor transport in marketing the crop.

For the year under review I am unable to report that any solution for this important and difficult problem has been found. The situation was discussed very fully, however, with the ginning community, and there is no doubt that the ginners are anxious to accept any reasonable solution.

In this connection it may be of interest to refer briefly to some of the features of cotton development in Uganda which have a bearing on the present problem.

In its early stages the policy adopted was to grant ginnery sites at railhead. The difficulty was that as cotton seed had no value it proved to be cheaper to gin in up-country sites and the first policy was therefore modified so as to provide ginning and marketing facilities more or less throughout the cotton growing areas. Under this system the cotton acreage increased greatly and the industry flourished until the collapse of the post-war period of inflated prices.

This system was developed during a period of abnormally high values when the native received a very high price for his raw cotton in spite of the fact that ginning costs were unduly high. In fact, ginning costs at this period were of secondary importance.

With the return to normal or subnormal price levels, however, it becomes only too apparent that ginning and marketing costs are much higher than they need be and that the elimination of unnecessary costs would enable better prices to be paid to the producers.

For both agricultural and economic reasons the ideal that now emerges is a system under which

- (a) cotton produced in any one area is marketed and ginned in the same area;
- (b) the distribution of buying posts is such as to encourage production;
- (c) the number of stores at buying posts is closely related to the amount of cotton to be purchased;
- (d) the number of ginneries is reduced to a minimum consistent with production of lint of an even character; and
- (e) the use of lorries for marketing raw cotton is made economical.

The ginning capacity of the Protectorate is now stationary at 2,770 single roller gins or the equivalent. These are distributed in 194 erected ginneries and served by 150 established market centres.

A first step towards reduction of redundant ginneries has been taken already, in that many of the ginneries are not actually worked but are used as buying posts only. There has been an average of 71 of these so-called "silent" ginneries in the last three years, and in some cases more economical ginning arrangements have been made by moving gins from uneconomical to economical ginneries.

The reduction to 120 working ginneries means that with a 250,000 bale crop the average out-turn per working ginnery has been increased from 1,030 as it stood in 1929 to slightly more than 2,000 bales per annum.

A beginning only has been made, however, in this process of consolidation and rearrangement, and there are still many ginneries with an out-turn of below 1,000 bales per annum.

That we could go a great deal further in this direction of consolidation is indicated by the fact that the Gezira crop of the Anglo-Egyptian Sudan, which is comparable in volume with the Uganda crop, is ginned in eight ginneries each capable of turning out 1,650 bales of 400 lbs. per day.

While a reduction of ginneries in Uganda to any such number as eight would be entirely unsuited to local conditions where soils, climates and cotton types are much less uniform than in the Gezira, yet it seems reasonable to visualize reduction to a point at which ginneries will have an average out-turn of something like 5,000 bales per ginnery.

There is no doubt that substantial reductions in ginning and buying costs are now necessary in order that the highest possible price may be paid to the natives for their raw cotton. It is equally necessary for the ginning industry that the process of rationalisation should be carried a step further at this stage, and, as pointed out in my last report, there are reasons concerned with the quality of the cotton produced with the control of insect pests and diseases and with the proper distribution of a pure seed supply which make a change of some kind imperative. The subject has engaged the closest attention of Government during the year, and is still under active consideration.

COFFEE.

7. Details of the approximate acreages under this crop, both the arabica and robusta species, will be found in the appendices to this report.

Good yields were obtained in most parts of the Protectorate, and a reference to the comparative statement of exports from the Protectorate for the past few years will indicate that a marked expansion of production of this crop has taken place, the total value of coffee exported during the year being approximately a quarter of a million pounds sterling as compared with approximately £160,000 in 1931.

In the Bugishu district of the Eastern Province the acreage under arabica continues to expand, and the demand for seedlings by the native coffee growers shews no signs of any lessening of interest in this crop.

The Native Administration Coffee Scheme referred to in my last report was expanded during the year by the erection of additional temporary pulping stations. It is interesting to be able to record that the carefully organised and orderly buying and factory arrangements developed under this scheme have been reflected in the comparatively high prices received for the coffee marketed.

During the year the Coffee Grading Ordinance, 1930, was brought into operation, and although some difficulties have arisen, it is the general opinion of the exporting houses that this Ordinance has resulted in a definite improvement in the quality of the coffee exported. The prices received by natives have also been much higher than in previous years, and this may be in part an effect of the Ordinance.

TOBACCO.

8. The report of the officer in charge of tobacco development work will be found at page 27. It will be seen that a steady advance in the development of tobacco growing by natives in Bunyoro is taking place.

It can hardly, however, be emphasised too frequently that a strict control of tobacco for export is essential if Uganda leaf grown by natives is to find a ready sale in the home markets.

The extracts given from the reports on the consignments shipped home by Government at the end of 1931, indicate that well-packed tobacco is reported upon favourably.

The question of the manner in which this maintenance of quality for export can be assured is engaging the attention of Government.

SUGAR.

9. The total acreage under cane in 1932 on the two estates, at Lugazi and Kakira, was increased from 8,440 acres in 1931 to 10,250 acres in 1932.

Some damage by locusts was experienced during the year, but notwithstanding this the total production of white sugar amounted to 8,832 tons.

Under protection afforded by the Customs tariffs, the production of sugar in the East African territories has made rapid progress and the stage has now been reached at which production exceeds local consumption. With the present world over-production of sugar and the consequent depressed prices, any surplus of East African sugar exported for sale on the world's markets must be disposed of at a considerable loss to the producers.

The local or East African sugar market has expanded steadily as a result of the establishment of local mills, but this steady expansion ceased as the spending power of all sections of the community was reduced with the contracted value of exports. This reduced spending power has resulted in East African sugar requirements being lowered to approximately 13,000 tons, whereas the potential production of the local mills is approximately 30,000 tons.

Over-production appears to be a temporary phase only, but while it lasts the problem is a difficult one for the industry to deal with. The Governments concerned were considering at the end of the year whether any practical steps could be taken to assist the industry through this temporary period of difficulty.

General Development.

10. (a) *East of the Nile*.—A report on conditions obtaining in this area will be found at page 14.

This area comprises the whole of the Eastern Province and the Lango, Gulu, and Chua districts of the Northern Province, and the field staff consists of one Senior Agricultural Officer and five Agricultural Officers, with experiment stations at Serere, Bugusege, Ngetta, Kamuge and Wanyange.

Serere and Bugusege stations are maintained from Central Government funds, whilst the last three stations are financed from Native Administration funds.

As pointed out in the report, special efforts were made to increase the acreage under groundnuts in this area, but in many cases a lack of seed tended to limit the acreage planted. On account of the inadequate marketing facilities not many tons of the groundnuts were sold, but there is now sufficient seed to make a substantial acreage increase possible in 1933.

A large portion of this part of the Protectorate is admirably suited to the production of this crop and it is hoped that the introduction of organised marketing arrangements will assist in the stimulation of its production.

(b) *West of the Nile*.—During the year a Senior Agricultural Officer has been stationed at Kampala for the primary purpose of ascertaining the status of agriculture in Buganda with a view to formulating a plan designed to promote its general welfare and advancement.

The report of the Senior Agricultural Officer will be found at page 20, and it is published in full as it seems desirable to draw attention to the present position in regard to agricultural development in Buganda. The position, as elaborated by the Senior Agricultural Officer, cannot be regarded as satisfactory, and it may be said that agricultural development in Buganda has not kept pace with that of the surrounding areas, more particularly the Eastern Province.

The Buganda are blessed with a soil and climate probably unsurpassed in the whole of tropical Africa, and are notably an intelligent and industrious people striving very hard to improve their social conditions rapidly. It costs money to build plague-proof houses, to send children to schools, to build churches, to provide the hundred-and-one things for which the Baganda are striving, and the money can come only in Buganda from the crops which are grown in the soil.

It is therefore disappointing to find that less cotton per taxpayer is now produced in Buganda than in Busoga, that soil fertility is too often not being maintained, that cotton shambas are frequently badly tilled, and that coffee shambas are generally not taken care of as they might be and are not, speaking generally, in nearly as good order as those in Bugishu; that there has been, as the Senior Agricultural Officer properly points out, a definite lowering of the standard of cultivation in recent years.

We know that all that is required is strict attention to a few simple rules of cultivation, most of which are in common use by progressive Baganda. The problem is how to convince the ordinary peasant cultivator, and induce him to improve his methods.

It is a pleasure to record that the Honourable the Provincial Commissioner and the whole staff of the Provincial Administration are taking a most active and sympathetic interest in this problem. With their assistance and that of the Native Administration it should not prove to be impossible to reorganise the agricultural propaganda service in Buganda so as to check present undesirable tendencies and to lead to a marked increase of wealth and prosperity within a reasonably short period of years. This problem has received much consideration during the year, but no definite solution has yet been found.

It is, perhaps, self-evident that the individual peasant can be reached effectively only through the minor chiefs and that no scheme for improving matters will be of any practical value unless it has the whole-hearted sympathy and co-operation of the leaders of the Baganda people.

Signs are not wanting that the Baganda are beginning to realise that all is not well with Buganda agriculture, and it is a pleasure to record that the Native Government is taking a sympathetic and practical interest in the matter and that the Provincial Commissioner is directing towards it the whole valuable machinery of the Provincial Administration, without which it is impossible to obtain the best results. I cannot accentuate too strongly the value of this co-operation.

In the Western Province, on account of lack of staff, it is not possible to organise the work of the Department on such intensive lines as in the Eastern and Northern Provinces, but during the year the stationing of an officer in the Ankole district has facilitated development of arabica coffee growing by natives in that district, and at the end of the year it was estimated that a total acreage of 1,681 acres was planted with this crop, approximately 500 acres having been planted during 1932.

The Agricultural Officer in his report states that "The demand for plants is increasing to such an extent that nursery facilities will have to be extended considerably as quickly as possible."

In the Toro district of the Western Province, the only development which has taken place has been in connection with robusta coffee growing in Bwamba, where an additional 26 acres were planted up.

The long transport to railhead coupled with the lack of organised marketing of the crop have resulted in a return to the grower which is not such as to lead to a rapid development in this area.

In the West Nile district of the Northern Province it was found possible to post an Agricultural Officer for work in that district during the whole of the year, the officer being stationed permanently in that district from August onwards.

This district, combined with the Madi sub-division of the Gulu district, is one of great possibilities, although on account of its outlying position, the prices received by the producer must of necessity be lower than those ruling in areas near to the main line system of the Kenya and Uganda Railways.

The posting of an Agricultural Officer to these areas has enabled much more attention to be directed to agricultural development, and in addition to a considerable increase in cotton cultivation, experiments were carried out in the growing of coffee, tobacco and linseed.

The Maintenance of Soil Fertility.

11. Without going into details it may be of interest to record that the year has brought to an end a period of experimentation to maintain soils in a satisfactory condition of fertility by the use of rotations embracing the basic idea of ploughing or digging-in a green manure whenever required.

A million acres are now devoted to cotton cultivation that were not cultivated prior to 1920, and erosion coupled with loss of humus is taking place, therefore, in the Protectorate at a greatly accelerated rate.

Prior to 1920 soil regeneration had been accomplished through the centuries by the simple device of allowing shamba land to revert to grass or bush for a period of years as soon as it became too poor to produce satisfactory food crops. As the pressure of population and as areas under such crops as cotton increase it becomes less and less easy to give the land the necessary rest. In temperate and sub-tropical countries and in parts of the tropics the problem has been solved through the introduction of rotations and periodical use of green manures.

This method has been experimented with in detail and over a period of years at Serere, Bukalasa, and minor agricultural stations, and can now be called a failure under Uganda conditions in so far at least as they apply to native agriculture. These experimental farms and stations are therefore being re-aligned so as to provide in the rotation for a resting period under grass.

The experience at Serere and at Bukalasa has shewn that in the long run an improvement in the African's own method of shifting cultivation is likely to give a better solution of the problem than is the direct introduction of Western methods. The problem is essentially one of humus conservation rather than one of conserving the

food materials of plant life and cannot, therefore, be solved by the application of fertilisers. If a satisfactory method of conserving humus can be devised, as it undoubtedly will be, the time may come when it will pay to use fertilisers as well.

Where rotations involving a resting period are not possible, as in the case of permanent or semi-permanent crops such as coffee, the use of a mulch which again counteracts humus destruction, has given outstanding results under Uganda conditions. In Bugishu the trees have been practically rejuvenated by applying for two years a surface mulch of banana leaves. In Bunyoro and in Bwamba excellent results have been obtained by the application of a six- to eight-inch mulch consisting of freshly-cut elephant grass.

Legislation.

12. (a) *Coffee Grading Ordinance, 1930.*—The Ordinance was amended during the year so as to simplify the exclusion from the provisions of the Ordinance any coffee produced on an estate and exported directly by the owner or manager thereof under his own mark.

As mentioned under coffee, this Ordinance was brought into operation during the year, and certain minor difficulties have arisen in regard to the establishment of licensed curing works. It is the intention of Government to review the working of the Ordinance at the end of the first season, with a view to introducing any modifications which may be found necessary.

(b) *Native Produce Marketing Ordinance.*—In view of the need for an increase in the production of exportable produce ancillary to cotton, Government passed this bill which was designed particularly to facilitate and stimulate the export of tobacco and groundnuts by providing for an orderly system of marketing. Considerable opposition to the measure was registered by petty traders, but as the legislation was passed too late for use in 1932, no report can yet be made as to how it affects this or any other class of the community.

Under the present system of uncontrolled purchase by small petty traders the producer in many cases receives much less than the economic value for his produce, and it is considered that by centralisation of marketing with purchase for cash only, a greater incentive to production will be effected.

Agricultural Education.

13. The report of the Superintendent of Agricultural Education will be found at page 24.

As the result of experience gained since the commencement of the training in higher agricultural education, consideration was given to an alteration of the course, and it was decided to lengthen the course by the inclusion of a one-year's practical training prior to the final year of the course. This revised course is to come into effect in 1933, and will bring the training into line with that of Medical and Veterinary students.

During the year two small-holding schools for Africans were commenced at Bukalasa and Serere respectively. This marks the first attempt, small though it is, to give practical instruction to would-be African farmers. The pupils will do all the work on these holdings and at the end of two years should be in a position to manage a ten- or fifteen-acre holding in such a way as to produce a satisfactory income and in such a way as to maintain the soil in a satisfactory condition of fertility in perpetuity.

J. D. TOTHILL,

Director of Agriculture.

ANNUAL REPORT ON AGRICULTURE IN THE EASTERN PROVINCE, AND IN LANGO, CHUA, AND GULU DISTRICTS OF THE NORTHERN PROVINCE, 1932.

Meteorological.

The total rainfall in 1932 was about normal in most districts although it had a somewhat unusual distribution. The rains commenced as usual in March. May was an exceptionally wet month, June and July were drier than normal, and September again was exceptionally wet. The December rainfall was also unusually heavy.

In general the weather was moderately suitable for all crops.

Cotton.

Marketing of the 1931-32 Crop.—The marketing season opened in all districts on the 25th January. Sales were brisk from the commencement and most of the crop had been sold by the end of the first four weeks. Prices ranged from Shs. 7 to Shs. 12 and even up to Shs. 17 in one or two places. The average price for the season was approximately Shs. 10/50 near railhead and Shs. 9/50 in more distant parts. Grade was below normal in all areas. The unremittent use of lorries proved again to be detrimental to grade.

The following table shews a comparison of the acreage and yield for the two seasons 1931-32 and 1930-31:—

District.	Acreage.		Sales in Tons.		Yield per Acre in lbs.	
	1931-32	1930-31	1931-32	1930-31	1931-32	1930-31
Busoga	137,887	132,890	30,698	20,085	498·7	338·6
Budama	37,299	31,816	6,026	3,561	361·9	250·7
Bugwere	112,039	107,484	11,583	11,099	231·6	231·3
Bugishu	47,592	26,793	3,599	2,305	169·4	192·7
Teso	115,626	118,813	9,546	17,429	184·9	328·6
Lango	52,483	66,757	6,143	11,162	262·2	374·5
Chua	12,248	12,000	472	1,943	86·3	362·7
Gulu	26,200	19,915	829	4,294	70·9	483·0
	541,374	516,468	68,896	71,878	285·1	311·7

1932-33 SEASON.

SEED DISTRIBUTION.

Teso District.—S.G. 29 seed was distributed to Soroti, Amuria, Usuku and Napak counties from Bugondo, and to Kumi county from Ng'ora, to complete the distribution of a new strain throughout the district.

Gulu and Chua Districts.—Germination tests showed that the seed in these two districts was useless for planting and fresh seed was introduced from Busoga, 130 tons for Gulu and 120 tons for Chua.

Closed Areas.—Chua district, and the whole of Gulu district with the exception of Kamdini gombolola, were declared closed areas during the year. The movement of raw cotton out of these areas is prohibited in an attempt to retard the spread of Pink Bollworm, which is carried in the seed, southwards into the neighbouring districts. For the same reason an area on the Gulu—Lango boundary was declared an isolated area, the planting of any cotton seed within this belt being prohibited.

Segregated Areas.—In order to accelerate multiplication and distribution of any new strain of cotton produced on Serere Experiment Farm, a new system was prepared and approved. This system requires the following stages for seed multiplication before the seed is distributed to outside areas:—

Stage (a)—Serere Farm	...	...	...	...	40 acres.
" (b)—Mulondo Miruka	...	...	...	...	400 "
" (c)—Kadunguru and Labori	...	...	...	...	4,000 "
" (d)—Remainder of Kasilo county, Serere county and a portion of Asuret gombolola	...	...	...	...	28,000 "

From Stage (d) sufficient seed should be available, on a multiplication ratio of 7:1, for 196,00 acres.

In a good cotton year the ratio from Stage (d) will be much higher than the above ratio of 7:1. The three areas (b), (c) and (d) above were therefore declared segregated areas and the movement of raw cotton in or out of the areas prohibited.

1932-33 CROP.

Planting.—The 1932 acreage constitutes a record for all districts, with the exception of Gulu, which is some 5,600 acres below the previous year. This is a most praiseworthy effort on the part of the native farmer. The total for the area is 66·8 per cent. of the grand total for the Protectorate.

In Teso district 16 per cent. of the crop was planted in May as compared with 6 per cent. in the previous season. It appeared highly probable at that time that the bulk of the crop in all districts would be early planted, but a dry spell in June and early July delayed the work. Consequently, a higher percentage of the crop had to be planted in late July and early August.

The following tables give statistics relative to the planting of the 1932-33 crop.

MONTHLY PLANTINGS IN ACRES PER DISTRICT—1932-1933.

District.	May.	June.	July.	August.	September.	Total 1932-33.	Total 1931-32.
Busoga ...	730	12,717	115,544	80,644	11,636	221,271	137,887
Budama ...	745	7,980	30,332	20,355	4,888	64,300	37,299
Bugwere ...	2,084	25,866	55,306	32,425	7,849	123,530	112,039
Bugishu ...	420	9,741	28,438	10,121	96	48,816	47,592
Teso ..	21,572	40,164	50,393	21,502	850	134,481	115,626
Lango ...	1,493	19,576	48,248	13,254	612	83,183	52,483
Chua ...	...	...	14,000	2,000	2,000	18,000	12,248
Gulu ...	...	...	20,600	...	...	20,600	26,200
	27,044	116,044	362,861	180,301	27,931	714,181	541,374

MONTHLY PLANTINGS AS PERCENTAGES OF DISTRICT TOTALS—1932-1933.

District.	May.	June.	July.	August.	September.	Total.
Busoga ..	0·3	5·7	52·2	36·4	5·3	99·9
Budama ...	1·2	12·4	47·2	31·7	7·6	100·1
Bugwere ...	1·7	20·9	44·8	26·2	6·4	100·0
Bugishu ...	0·9	20·0	58·3	20·7	0	99·9
Teso ...	16·0	29·9	37·5	16·0	0·6	100·0
Lango ...	1·8	23·5	58·0	15·9	0·7	99·9
Chua ...	...	...	77·8	11·1	11·1	100·0
Gulu ...	...	...	100·0	...	...	100·0
EASTERN PROVINCE AND NORTHERN PROVINCE ...	3·8	16·2	50·8	25·2	3·9	99·9

Condition of the Crop.—The yield prospect at the end of the year is promising. Throughout the period of growth and bolling the weather has not been too unfavourable and the incidence of disease and pests not over serious. Fears were entertained after the very wet weather in September that Angular Leaf Spot and Blackarm would spread rapidly, but fortunately these were checked by the dry weather in October. Helopeltis, Lygus, and Spiny Bollworm, although more prevalent than usual, did not cause serious damage in the year under review. The unusually late rains in December lowered the grade and delayed picking in many areas, but in general the grade is better than in the previous season.

There is still considerable room for improvement in the matter of yield per acre. The stand per plot is unnecessarily poor in all areas. The standard spacings of 4 ft. × 1½ ft., or of 3 ft. × 1 ft. introduced this year into Lango and Teso, require areas per plant of 864 square inches or 432 square inches respectively. An analysis of the figures supplied to the Assistant Botanist, Serere, give the following mean areas per plant, in square inches for the following districts:—

District.	Mean Area per plant in Square Inches.
Busoga ...	1,472
Budama and South Bugishu	2,185
Bugwere and North Bugishu	1,827
Teso ...	1,416
Lango ...	1,589
Chua and Gulu	1,770

The Lorry Problem.—The unrestricted use of the lorry in regard to the transport of unpurchased raw cotton has become a problem of increasing importance during the last few years. It is now fully realised that some measure of control is imperative to prevent a continuation of its adverse effect on the cotton industry in general.

In view of the competitive scramble for raw cotton the buyers have developed the practice of increasing their buying areas by means of lorries. The raw cotton purchased at any one building is therefore a mixture of growths produced in widely distant localities on varying types of soils and possessing wide variations in character and staple. It is obviously in the interests of the ginner themselves to turn out bales of even-running lint. It is extremely doubtful whether this practice of sending out lorries long distances for raw cotton results in a marked increase, over a series of seasons, in the buyings of any one ginnery, since the method gives rise to retaliation.

Another result of the use of lorries is the lowering of grade. The driver of the lorry seldom, if ever, examines bags on collection. On arrival at the buying post the buyer will hardly ever refuse a bag of low grade which has been carried a considerable distance because his sole object in sending out lorries is to make his buying post popular and thereby increase the flow of cotton. Should he refuse to purchase such cotton the grower will return disgruntled to his home and spread the news of his failure to sell to that particular buyer. If a lorry driver was working on his own he would distract such cotton to another buyer less scrupulous, rather than run the risk of transporting the cotton for nothing. The method thus becomes a vicious circle between buyers and transporters at the expense of grade.

Apart from these effects, the growers who do not use their discretion, and they are many, acquire the lorry habit. They thereby forfeit a comparatively high proportion of their income for what is in many cases a luxury.

Coffee.

BUGISHU DISTRICT.

Marketing of the 1931 Crop.—In order to improve the quality of the crop, and to obtain more uniform preparation, it had been decided to erect Lukiko pulping stations at various centres to supply uniform parchment for the factory at Bubulu. Permanent stations were erected at Makuyu and Bulucheke with drying floors attached, besides that built as part of the Bubulu factory. These stations were not completed until early in 1932 and the full scheme could not be brought into operation for the 1931 crop.

All coffee of the 1931 crop was therefore native-prepared parchment. The total crop was 264 tons, of which 184 tons were bought by local buyers and 80 tons by the Native Administration.

The parchment bought by the Native Administration, at 25 cents per lb., was properly dried and bulked at the Bubulu factory, part being shipped as "cleaned" and the remainder as "parchment." The consignments sent home were sold at good prices.

Marketing of the 1932 Crop.—For the 1932 crop the Bugishu Coffee Scheme was in full operation.

Besides the three permanent pulping stations mentioned above, temporary stations were erected at the following centres:—Sipi, Buginyanya, Bulago, Buluganya, Buhugu, Buyobo, Bududa, and Bunambale.

Each station consists of a shed containing a buying stand and shoot to pulper, three fermenting boxes and a washing tank, with water supply laid on; and also a store with 50 drying trays and rails for the trays. At Bubulu factory itself an additional store was built on to the main building, and the artificial drying barn completed.

At each station the coffee was bought in the *cherry* by measure, four-gallon, two-gallon, one-gallon and half-gallon measures being used, for each of which tickets of different colours were given for redemption at the end of the month. The cherry was pulped, fermented, washed and partially dried before being sent to the Bubulu factory for complete drying and cleaning, a system of book-keeping, buying returns and transport way-bills being evolved accordingly.

In addition to the above, native-prepared parchment was purchased by the Administration at four centres without a pulping station, *viz.*, Buwalasi, Bukonde, Busano and Bumbo.

Apart from the activities of the Administration, about 150 buying licences were taken out by local buyers, all being agents for, or selling to, five larger firms.

Prices paid to natives by the Native Administration were on the basis of 25 cents per lb. parchment, which worked out at Sh. 1/50 per four gallons of cherry. The price paid for cherry remained constant throughout the season. Local buyers started the season by paying about 20 cents a lb. parchment which was increased to 25 cents by the end of August and to 30 cents or higher at the end of September and during October. By the end of the season their prices were down to 15 cents and 12 cents per lb. During the middle of the season reckless prices were paid in many cases, and it is understood that some buyers lost heavily.

These small buyers in the district, working as agents for larger firms, encourage the production of bad coffee. Buying on commission basis, by weight, they encourage the sale of wet parchment, which is thus liable to spoil before being dried properly.

The total crop purchased by the end of December was equivalent to 687·1 tons of parchment. The Native Administration bought cherry equivalent to a total of 146·3 tons parchment, plus 29·2 tons actually purchased as parchment. These figures are on a conservative basis. No report has yet been received on the consignments sent home.

Distribution of Plants, 1932.—A total of 751,299 plants was distributed to natives in 1932. This is equivalent to 650 acres at a spacing of 6 ft. by 6 ft. Over 100,000 plants of similar age still remain in the Lukiko nurseries, having been withheld for distribution until the early rains in 1933. The above plants were grown in the four central coffee nurseries and transplanted into Lukiko nurseries, where they remained for a period of 9—10 months prior to distribution to the natives.

Seedlings for 1933.—Nearly one million seedlings were raised in 1932 and transplanted into the Lukiko nurseries for distribution in 1933. This amount is sufficient for 800 acres.

Pruning.—With the exception of seedlings from the Bulago Central nursery all the plants distributed to natives were topped at 6 ins. in the Lukiko nurseries to produce two branches prior to distribution.

The trees at lower elevations, which were pruned on the single stem system, but allowed unlimited terminal growth since 1930, now carry a good head of primaries. The primaries on the middle of the younger trees show some signs of “dieback.”

Good progress was made with pruning operations at the beginning of the year after the trees had recovered from cropping. Work in the past has been limited by the number of instruments available other than those in the possession of instructors. Seccateurs and saws were obtained for a number of natives at cost price, and this has led to a considerable demand to the benefit of the trees.

At high altitudes, where single stem pruning is practised, the trees remain in excellent condition.

Pests and Diseases.—The crop in 1932 was remarkably free from *Stephanoderes*, even in those areas where the incidence was heavy in 1931, notably round Bugusege and Bulucheke. *Antestia* was present but shewed no signs of increase and no serious damage resulted. Stem Borer was present in certain areas, notably Bunambale, Bukigai, Bufumbo and Bukiga, where infected trees were systematically stumped, or grubbed up where necessary. The stumped trees have made excellent recovery and two stems have been trained up. This method of control has proved effective so far. *Ceratitis* (a fruit fly living on the mucilage in the cherry) was present to the same extent as in 1931. *Hemileia vastatrix* was only in evidence at the end of the crop and was not serious. “Dieback” was again present in a somewhat serious degree at low altitudes where a heavy crop was produced in 1932. The old established trees and those under shade, especially over 6,000 feet, suffered least. *Cercospora* and Mealy Bug were also in evidence, but were only present to a small extent.

Oil Seeds.

Groundnuts and Sim-sim.—The following table shews the acreages under groundnuts and sim-sim in the Eastern Province and Lango. Figures for Chua and Gulu are not available.

District.	Groundnuts.		Sim-sim.	
	1932. Acres.	1931. Acres.	1932. Acres.	1931. Acres.
Busoga	13,267	8,496	6,599	5,597
Budama	4,323	1,328	6,198	2,604
Bugwere	12,588	11,400	19,933	17,973
Bugishu	1,166	895	2,255	487
Teso	22,785	19,325	12,531	21,581
Lango	5,120	6,320	47,068	59,730
	59,249	47,764	94,584	107,972

A special effort was made during the year to increase the production of groundnuts for sale so that the grower might have a secondary source of income in addition to cotton. Whilst the total acreage shews a slight increase on the previous season, the result did not reach expectation. This was due mainly to a shortage of seed, the growers having consumed their reserves during a period of food scarcity after the locust infestation in the previous year.

The yields were moderately good in all areas. The dry spell in June, and early July, caused slight premature ripening of the late crop, and locusts caused slight damage to the “bunch” variety in Bugwere district. Rosette disease was present in all areas, but as usual was not serious.

It was intended to establish Government controlled markets, under the Native Produce Marketing Ordinance, for the sale and purchase of this crop. Such markets, however, were not necessary this year. In Teso the natives sold or bartered their crop to local buyers and in other

districts the growers preferred not to sell so as to increase their reserves of seed. A number of decorticating machines were available at various centres to obviate the tedious hand-shelling, but the amount of produce brought in hardly called for their use. Further encouragement will be given in 1933 and proper markets established where necessary.

In order to determine the most economic method of shipping groundnuts to the home market, a trial consignment of three pressed bales of unshelled nuts was sent home for report in December, together with a consignment of kernels equivalent in weight to the product of one of the bales, for comparison of costs. Bale No. 1, containing 652 lbs. of unshelled nuts, was pressed at 1·20 tons pressure to half normal cubic capacity of the unshelled nuts. This bale came out rather oily with crushed nuts. It showed that too much pressure had been used as the loss in oil was considerable. Bale No. 2, containing only 400 lbs. of unshelled nuts, was given less pressure—0·8 tons.

This bale had loose ends but whole nuts. Bale No. 3, with 500 lbs. unshelled nuts and the same pressure as Bale No. 1, came out well, the nuts being only slightly crushed and the hessian only slightly marked with oil stains. As this bale was considered to be the best, an equivalent amount of hand-shelled kernels derived from 500 lbs. unshelled was shipped home for comparison. The quantity of nuts obtained was 344 lbs., equivalent to 68·8 per cent. shelling out-turn.

The total acreage under sim-sim was slightly below last year's figure owing to a reduction in acreage in Lango and Teso districts. This again was due to a shortage of seed. Yields were normal throughout the area. It is hoped in 1933 to include sim-sim with groundnuts in the proposed new arrangements for marketing.

Shea Nuts.—A consignment of approximately 20 tons seed of shea nuts was sent home again this year for broker's valuation and report. The nuts were purchased in North Teso as in 1931. The price paid to the natives in 1931 was 3½ cents, and this season only 3 cents per lb. The nuts purchased this season appeared to be of better quality than those purchased last year. No report has yet been received.

Ploughing.

Ploughing instruction and training was carried out in all districts: by Mr. Gray, Ploughing Instructor, in Lango and Busoga, and by trained native instructors in other areas. The following figures shew the total number of ploughs in use during 1932 as compared with 1931:—

<i>District.</i>				<i>Total Ploughs in use 1932.</i>		<i>Total Ploughs in use 1931.</i>		<i>Increase.</i>
Busoga	...	...	...	101	...	76	...	25
Budama	...	...	..	41	...	26	...	15
Bugwere	...	...	...	2,905	...	2,650	...	255
Bugishu	...	...	...	20	...	14	...	6
Teso	...	...	...	8,280	...	7,849	...	431
Lango	...	...	...	223	...	156	...	67
TOTAL				...	11,570	10,771		799

In addition to the above a few ploughs were also in use in Gulu and Chua districts.

In Lango district ploughing instruction and training was concentrated mainly in the central and western portion of the district, comprising the counties of Eruti, Kwania, Koli and Atura. Little had been achieved previously in these counties although large areas of land suitable for ploughing are available without any preliminary clearing being necessary. Training and other demonstration work was also carried out to a lesser extent in the counties of Dokolo and Maruzi. In all, 369 cattle and 570 men were trained. Cattle and ploughs were loaned to the Prison farm and some 274 prisoners received varying periods of instruction during the year.

The total number of trained teams of cattle at work during the year was 245, comprising 21 teams of 2-span, 224 teams of 6-span, or a total of 1,428 oxen. In addition 200 Lukiko-owned oxen were used at various times on the 100-acre clearings at Ngetta and Aduku.

The result in Lango is satisfactory considering the comparatively small number of able-bodied men who possess sufficient cattle for a full team. In order to overcome this difficulty a successful attempt was made in Koli county to bring together neighbouring farmers, owning two or more oxen each, to form combined teams. The owners were loaned a Government-owned plough and they and their cattle were trained on land in the vicinity, the ploughed land being afterwards shared out in proportion to the number of cattle supplied. This method was popular with the peasant and it will be extended in 1933.

In Gulu district three ploughing centres were operating early in the year, at Gulu, Paranga and Lamogi. Unfortunately it became necessary to abandon training, except in isolated areas, owing to the incidence of Trypanosomiasis. Plough owners who were visited were found to be making good use of the plough.

In Busoga progress has not been rapid. This is due mainly to a shortage of sufficient cattle for full teams and the heavy work of clearing bush land. The majority of those who possess ploughs, however, are said to have cultivated an average of 10 acres each during the year.

In Teso and Bugwere ploughing is now well established. The peasants consider the plough to be a necessary adjunct to cultivation and they are making rapid progress under the supervision of the native instructors. An increasing interest is also being taken in Budama and in the more level parts of Bugishu.

The position at the moment is one of steady progress in all areas. Admittedly this progress is slow but there are many difficulties in the way, such as lack of money, the hard work of clearing bush land and the small number of suitable cattle owned by the individual. Development will depend upon an increase in the purchasing power of the farmer. It is necessary, however, to sound a note of warning in this connection. To speed the plough is only one step in the right direction. The farmer cannot reap the maximum benefit from ploughing alone. He must have other implements, such as harrows and single-ox cultivators, otherwise he is in the position of being unable to weed and hand cultivate his increased acreage. All such implements, however, cost money. In fact they are far too expensive when compared with the purchasing power of the farmer. To speed mechanical cultivation, therefore, the suppliers of these implements will have to reduce prices, or produce new types of implements at prices within reach of the farmers' ability to pay.

The 100-Acre Clearings.

These large clearings were opened up by Government in 1929 and 1930 at seven sites in the Eastern Province and Lango. During the year under review the natives shewed an increased reluctance to participate in the scheme. Portions only of the blocks at Kamuge and Jami in Bugwere, and at Aduku and Ngetta in Lango, were farmed by the natives, who were helped with the loan of cattle, ploughs and harrows. These volunteers, however, shewed but little keenness after the crops were planted and considerable difficulty was experienced in persuading them to weed and harvest what they had sown. At the end of the year it was obvious that the scheme as it stands is a failure. The native prefers the old method of shifting cultivation to which he is used, and any new method is viewed with suspicion. It may be possible to utilise the land as small holdings at a later date when the younger and more progressive farmers realise the advantages of settling on a compact area of land.

Locusts.

The position in 1932 was nothing like so serious as in 1931. During the first quarter of the year there were numerous small bands of hoppers scattered over the area, but these were very largely destroyed by burning and beating. Instructions were given that the normal grass burning should be delayed as long as possible so that when hoppers appeared they could be more easily destroyed by fire. In May a more severe infestation developed and flying swarms and hoppers became general everywhere. Beating of young hoppers met with some success but a high proportion reached maturity. By July the pests had largely disappeared. In August and September only a few flying swarms were reported. Swarms again became more numerous in October and egg-laying started towards the end of that month, continuing well on into November. Most of the subsequent hoppers were destroyed in grass fires in December, except in the extensive thinly populated areas in the North, where a number of bands reached maturity.

Throughout the year a certain amount of damage was done to food crops, but nowhere were the grain crops destroyed wholesale as in 1931. Supplies of sweet potatoes and cassava were so abundant that the damage caused by locusts made little difference to the food position.

Experimental Work.

A full report on the experimental work carried out during the year will appear in the Annual Report, Part II.

D. STEDMAN DAVIES,

Acting Senior Agricultural Officer.

ANNUAL REPORT OF THE SENIOR AGRICULTURAL OFFICER, BUGANDA.

General.

I was posted to Buganda Province, with headquarters in Kampala, at the end of March, 1932.

2. During the year I have attempted to organise an agricultural service in Buganda, the ultimate object being the development of a better system of farming amongst natives of the Province.

3. The work naturally falls into two main divisions:—

- (a) The improvement of present agricultural practice.
- (b) The introduction of improved methods of farming.

4. *The Improvement of Present Agricultural Practice.*—The standard of cultivation of all crops in Buganda is poor. Further, I am of opinion that the standard of cultivation is, each year, becoming lower. This gradual deterioration may be attributed to several causes, of which the most important would appear to be:—

(a) The work of cultivation has always been the work of the women of the tribe. The men are not agriculturally minded. Under present conditions it is stated that girls refuse to work in the fields after leaving school, and it is certain that women in general spend more time visiting friends, proceeding further afield as the result of better transport facilities, so that the work at home is scant and hurried. The younger generation of men, too, are not inclined to take up farming as a means of livelihood.

(b) The natural inherent fertility of the soil and the favourable climate permit of the growing of sufficient food and economic crops to satisfy growers' present requirements with the minimum output of work.

(c) In general there is no shortage of land.

(d) The Native Government, and in this term I include chiefs of all grades, has not in the past taken a real interest in agricultural activities. I realise there are several reasons for this, but I must record this lack of interest as being, in my opinion, one of the causes which has brought about a gradual but steady deterioration in the standard of farming in Buganda.

5. Prior to the introduction of cotton, the principal crops grown were plantains and potatoes, together with small plots of beans, maize and miscellaneous vegetables. The system under which these crops were grown tended to prevent soil erosion or loss of humus. The introduction of cotton brought large areas under cultivation and introduced a number of new problems in connection with the maintenance of soil fertility, which problems have never been appreciated or realised by the people who farm the land. Most of the arable land in Buganda is on a more or less severe slope. These large plots prepared for and planted with cotton are exposed for a number of months to heavy rainfall and intense sun, the plots are kept under cultivation for a number of years—until they become practically useless on account of loss of fertility—and particularly during the time they are clear of vegetation they suffer great losses from soil erosion and exhaustion of humus. When the soil in such plots becomes worn out the plots are allowed to revert to bush for a number of years when, it is stated, the original fertility is restored.

The argument is frequently adduced that there is plenty of land in Buganda and that this system of farming—shifting cultivation—is the best under the climatic conditions which obtain. This may be so in areas of sparse population. The ill-effects of this system in areas of relatively dense population, *e.g.*, Kyadondo, can, however, already be seen. In such areas all land is rapidly becoming useless owing to soil erosion, and the fact that it is not possible to allow exhausted land to revert to bush for a sufficient number of years. Land high up on the sides of hills is now being used, the soil in such places is poor, yields are low, and the steep slopes of such places hasten loss of fertility by erosion.

It is possible to conceive in the not distant future, that when the Baganda adopt a higher standard of living with consequent need for more money, and when the population increases, a greater area of land will annually be under cultivation.

When such a time comes it will, in my opinion, be found that the general impoverishment of land will become more intense, and, further that those areas which are now worn out and are not, and cannot be, allowed to revert to bush on account of pressure of population, will cease to be of any value whatsoever for agricultural purposes.

6. It is not that the Baganda do not know how to grow the various crops such as plantains, cotton, coffee, groundnuts, etc. The gradual deterioration of the standard of cultivation has, I submit, been brought about by the interaction of those causes which I have attempted to set out in para. 4 above.

One other factor should, perhaps, be mentioned in this connection. During the years after the war and until 1929, when price levels were high, the Baganda could afford to employ immigrant labour to help with the cotton crop and very large numbers did so. The high prices for produce which then prevailed permitted of the payment of such labour either in cash or food and left a money balance sufficient to satisfy all demands made upon growers for taxes and for the purchase of the necessities of life.

With the fall in the value of all primary products which took place in 1929-30 the position, from the growers' point of view, became difficult. If immigrant labour was employed the cost of such labour was, generally speaking, as much as the resultant crops were worth; the Baganda were unused to doing the work themselves, and the standard of cultivation suffered accordingly.

The nett result is that at the present time, although there was during the past year a record acreage under cotton, growers spend considerably fewer hours per day working in the fields than they did in the past. The increase in the acreage of the cotton crop has been obtained at the expense of decreased yield of all crops per unit area.

7. It will be seen that before any permanent improvement in the standard of farming can be expected, a very considerable change will have to be effected in the outlook of the Baganda, both chiefs and peasants, towards agriculture. The development of the necessary interest in farming can, of course, at the best only be brought about gradually. To-day the Native Government does realise the importance of the maintenance and extension of the production of economic crops. There is as yet, however, very little idea of agricultural development in the real sense of the term. By this, I mean that whereas they see that without production the country cannot develop, they do not appreciate the fact that Buganda must ultimately develop as a real agricultural country with the majority of the population earning their livelihood from the land, nor do they appreciate the fact that a continuance of the present methods of farming must, if persisted in, ultimately result in the permanent impoverishment of large areas of fertile land. There are, however, indications that the importance and value of the land to the country is being realised. We have the fact that the Baganda are eager to own land. There are, too, an increasing number of men who have purchased up to 50 acres of land on which they live and where they are doing all they can to make a living out of their holdings.

There are further isolated cases of some of the bigger landowners attempting to develop their mailos. Another indication of this desire to make a living out of farming is the fact that in certain areas groups of young men have formed themselves into associations, the primary object of which is co-operative marketing.

It may not be out of place to state here on what lines it is hoped farming in Buganda will ultimately develop. There are three main classes of people to consider, the large mailo owner, the class of man I have mentioned above who has some 50 acres, and the ordinary peasant. From the point of view of development it is the second two groups which are the most important as numerically they are very much in the majority. It is to be hoped that the general policy of development will be directed to the encouragement of peasant proprietor small holdings as opposed to the opening up of large estates. It is, of course, to be hoped that the large estates which are at present undeveloped will in time become productive, but it is submitted that these will be subsidiary in importance to the peasant small holder.

8. During the year arrangements were made for the appointment of a Muganda Agricultural Adviser to the Native Government. The man selected, Om. Danieri Kato, has a real appreciation of the difficulties to be overcome and the ways in which it is hoped improvement will be effected. He had not been appointed when the year ended, but it is intended that he shall commence work in January, 1933. While he will be an employee of the Native Government he will be guided in his activities by this Department. It is intended that to begin with he will visit all parts of Buganda, meeting the chiefs and people in an attempt to get them to appreciate the fact that the standard of cultivation of all crops is poor, to show what can be done to effect improvement, and to attempt to instil greater enthusiasm towards the development of a better standard of farming.

9. *The Introduction of Improved Methods of Farming.*—The preceding sections have dealt with the question of the necessity for effecting improvements in the system of farming as at present practised. Apart from this there is the question of the gradual introduction of improved methods of farming such as permanent settlement on a given piece of land, manuring, rotations, etc. Before a new method can be advocated, however, it is necessary for this Department to prove by experiment that such new method is sound and suitable for the particular district or area concerned. At present we have only one centre in Buganda for experimental work, namely, Bukalasa. The climatic and soil conditions in Uganda vary greatly and in consequence one of the primary requirements is the acquisition of suitable land in typical areas for district sub-stations and the grant of adequate financial assistance for their maintenance. Such sub-stations would be used for the undermentioned purposes:—

- (1) to test seed of selected and improved varieties of all crops produced at the central experiment station at Bukalasa against the local variety;
- (2) to bulk up seed of those varieties of all crops which had proved superior to the local variety under (1) above, prior to distribution to growers;
- (3) to ascertain the economic possibilities of new crops;
- (4) for cultural experiments on all crops.

10. These sub-stations would serve a dual function. In addition to the experimental work outlined above, land at these stations would be set aside for demonstration work. Plots of all crops would be grown to show how each crop grown in any area should be treated from preparation of the land prior to planting to harvesting, how soil erosion can be prevented and fertility maintained. Further, it would be the intention to establish in time demonstration small holdings on the lines of that which has been in existence at Bukalasa for the past six years.

11. The Native Government have agreed to ascertain what suitable land is available at the thirty-four selected centres, it being understood that to begin with work will only commence at a few places, such work to be extended to other centres as staff and money become available.

Cotton.

12. Cotton Acreages and Sales.—

		1930/31		1931/32		1932/33	
		<i>Acres.</i>	<i>Tons.</i>	<i>Acres.</i>	<i>Tons.</i>	<i>Acres.</i>	
Mengo	...	99,506	16,729	145,320	26,391	157,668	
Entebbe	...	41,023	8,514	70,344	10,778	86,924	
Masaka	...	25,600	3,374	39,969	5,134	33,828	
Mubende	...	28,500	4,958	36,864	4,012	39,891	
TOTAL	...	194,629	33,575	292,497	46,315	318,311	

13. *Season 1931-32.*—During 1931 the weather from June to August was very favourable for planting and at this time there was every prospect of a record yield. Unfortunately, however, the rains continued until the middle of December, with the result that the majority of the plants developed excessive vegetative growth and both bud and boll shedding became severe. The change over to dry weather during the latter half of December was followed by an immediate improvement in the condition of the crop. The buying season opened on the 25th January, but during the first few weeks, as is usual, very little cotton was offered for sale. Prices during the season averaged Shs. 11/33 for 1st quality and Shs. 3/07 for 2nd quality, compared with Shs. 12/79 and Shs. 3/24 in the previous season. The crop totalled 46,315 tons, compared with the 1930-31 total of 33,575 tons.

14. *Season 1932-33.*—Except for a dry spell during July, weather conditions throughout the planting season were favourable and a record acreage estimated at 318,311 acres was planted. Conditions remained favourable throughout the growing period, and by the end of the year there was every indication of a record crop.

15. *Cotton Seed Distribution.*—The procedure followed during 1932 was similar to that which has obtained in Buganda for a number of years past. This Department requisitioned seed from ginners as required. Each and every native requiring seed applies to the nearest ginnery and is issued with seed by the manager of the ginnery. In some cases the custom has developed of owners of ginneries sending seed to one or more of their stores in the various markets from where it is distributed to growers by the ginners' representative. There are obvious disadvantages to this system, the principal being :—

(a) There is a very large wastage of seed. It is necessary to requisition more than is actually required as it is impossible to foretell how many people will apply at any particular ginnery. It happens, too, that growers delay applying for seed until July, when the ginnery is closed and all seed requisitioned has been issued.

(b) It is not possible to ensure that good seed is issued. The best seed is usually that obtained from the first purchases of seed cotton, and, although each firm is asked to reserve good seed for distribution, it is often not possible to do this owing to limited accommodation at the ginnery. A considerable proportion of growers do not apply for seed until June and July—in a short season many ginneries if they have not finished ginning are by then ginning fifti cotton and no doubt many growers get seed from this.

(c) The present system makes any scheme for the introduction and distribution of new varieties of cotton very difficult, if not impossible, to carry out owing to the probability of old seed being introduced into any area where a new variety is being grown.

During the year arrangements were made with the Native Government for some control over distribution during the next season. A scheme was drawn up which, though by no means ideal, should, if carried out by the chiefs, help matters considerably. The basic idea is that each gombolola is informed to what ginnery it should apply for seed and the amount to be taken. Requisitions are placed accordingly.

16. *Cotton Seed Farm for Buganda.*—For some years past consideration has been given to possibilities of organising a complete scheme for the production and increase of new improved varieties of cotton through all the stages necessary to obtain sufficient seed for distribution to growers. The need for isolation of the strain selected through all stages has to be borne in mind and the difficulty of obtaining land in Buganda has to be overcome. The past two seasons have shown a definite falling off in the quality of Buganda cotton, and the question of the introduction

of a new variety is now one of some urgency. At Bukalasa the Senior Botanist is engaged in producing and testing suitable strains. The strain or strains finally selected as the result of field trials both at Bukalasa and in the district (*vide* para. 9 above), and of brokers' reports and spinning tests, will be grown in the 30-acre increase stage at Bukalasa. Next it is necessary to find an area which can easily be isolated from other cotton where 300-400 acres of cotton can be grown, and it is this area which it is difficult to find in Buganda. During the year trials have been made on Buvuma Island to find out if this island would be suitable for the seed farm. Results, however, have not been encouraging.

Coffee.

17. District coffee beds have been maintained at twenty-two centres in Mengo and at twenty centres in Entebbe district.

The nurseries have been supplied with seed as required throughout the year, but germination of the first sowings was poor and several resowings had to be made.

As in previous years, the nurseries have been looked after by the Native Administration, under the supervision of this Department, but, owing to the low price of coffee during 1931, which resulted in a very small demand for seedlings and also to the difficulty of obtaining sufficient labour, the nurseries have not been kept in such good condition as in the past. With the rise of coffee prices during 1932, a renewal of interest has been shown by growers.

18. The Coffee Grading Ordinance, 1930, came into force on the 1st September, 1932. From that date until the end of December approximately 2,531 tons of native-grown hulled coffee were exported from Buganda.

Compared with the previous year, prices throughout the buying season remained favourable. Kampala prices for native hulled robusta coffee averaged approximately 30 cents per pound, arabica some 37-38 cents.

Five factories have been licensed as public curing works under the Ordinance.

Tests made in curing works in Kampala showed that with an average sample of native hulled coffee it was not difficult to obtain a good proportion—some 74-80 per cent. of F.A.Q. from the point of view of broken and defective beans. The total elimination of small stones is considerably more difficult.

It can be said that the introduction of the Ordinance has effected an improvement in the quality of native grown coffee exported, but the first season's working has brought to light some defects in the Ordinance which it is hoped will be remedied before the next crop is marketed.

Consideration has been given during the year to the various native methods of preparing the crop for sale with the object of ascertaining the best method of preparation under Buganda conditions. No definite results had been obtained by the end of the year.

Food Crops.

19. Under this head it is necessary to record the very serious damage which the banana weevil (*Cosmopolites sordidus*) is doing in Mengo and Entebbe districts. The severity of attack by this pest and the ease with which it can spread may, I think, be attributed to the fact that many—I might say the majority—of the plantain gardens are allowed to remain in a very neglected condition. No attempt has been or is being made by natives to combat the ravages of this insect and the supply of plantains for food is annually becoming less and less. It is to be hoped that some action will be taken in the near future in an endeavour to control the damage being caused. It may be considered possible to take action under the Diseases of Plants Protection Ordinance by the formation of a Local Board for Buganda who would recommend what action the Native Government could take to minimise the damage being caused.

During the year there was an increase in the area planted with groundnuts. The whole question of obtaining permanent increase in the production of minor economic crops turns on the organisation of the marketing system. I am sure no difficulty would be experienced in obtaining quite a considerable production of crops, such as groundnuts, if the growers were assured of proper marketing facilities.

20. I wish to record my appreciation of the help I have at all times received from Administrative officers, particularly the Honourable The Provincial Commissioner, Buganda, and the sympathetic consideration which has been given by the Provincial Commissioner and by the Native Government to the various proposals I have, from time to time, put forward for their consideration.

A. B. KILLICK,
Senior Agricultural Officer.

ANNUAL REPORT ON AGRICULTURAL EDUCATION FOR 1932.

Work during the year has included classes for elementary teachers and for departmental agricultural instructors at the Serere Farm School; classes for elementary teachers at the Bukalasa Farm School; agricultural courses at Makerere College; the laying-out and equipment of a model small holding at Serere for teaching purposes; and the inspection of the teaching of nature study and school gardening in the elementary schools of the country.

Details of the work done will perhaps be best given under the headings of the separate institutions concerned.

Staff.

I was on duty in Uganda throughout the year. Mr. R. W. Stuckey, Agricultural Officer was in charge of Makerere College agricultural classes until 2nd June, when he went on leave. He was still on leave at the end of the year.

Mr. M. G. de Courcy Ireland, Agricultural Officer, was in charge of Serere Farm School throughout the year and also inspected schools in the Eastern and Northern Provinces.

Mr. C. W. L. Fishlock, Agricultural Officer, was in charge of the Bukalasa Farm School until 2nd June, when he went on leave. He also inspected schools in Buganda Province.

Om. S. B. Sevume, African Agricultural Assistant, was stationed at the Bukalasa Farm School until the end of May. For the remainder of the year he inspected schools in Buganda Province. Om. Y. K. Musitwa, African Agricultural Assistant, was employed on school inspection work in Buganda and Busoga during the greater part of the year.

Serere Farm School.

Three courses in elementary agriculture were held during the year, as follows:—

(a) A course of four weeks' duration during March for subordinate instructors of the Agricultural Department. This was attended by twenty-nine instructors.

(b) A course of twelve weeks' duration in April, May and June for elementary school teachers from the Eastern and Northern Provinces. This was attended by twenty-nine teachers.

(c) A course of twelve weeks' duration in September, October and November was given to a mixed class consisting of nineteen elementary teachers from the Eastern and Northern Provinces and thirteen agricultural instructors from the Eastern Province.

This combined class was held because sufficient teachers were not forthcoming and instructors were brought in to fill up the accommodation.

Arrangements were made to modify the instruction according to the respective needs of the two sets.

The following subjects were included in these courses:—

Elementary Botany.
General Agriculture.

Animal Husbandry.
Simple Entomology.

Lectures and demonstrations were kept as simple as possible.

The Agricultural Officer who has been in charge of these courses writes:—"All the pupils who have attended the course have shown great keenness, but very few seem able to show any originality or powers of being able to work a problem out themselves. It is also very surprising how unobservant of Nature many of the teachers are compared with the uneducated natives; this is, I am sure, due to their previous training and is one of the chief difficulties they find here—as they prefer to learn everything from books."

Experience has shown that teachers derive most benefit from these courses if they take them after the completion of their Normal School course, and, preferably, after they have been teaching for a year or two. It has been arranged, therefore, to restrict the courses in future to men with actual teaching experience.

A dining and recreation room was completed at the beginning of the year and is a useful addition to the buildings.

In the second half of the year money became available for the establishment of a small holding for the training of natives as small farmers. By the end of the year the holding had been cleared and marked out and the buildings nearly completed.

If funds permit, a further two holdings will be started in the new year, the clearing for these had been done by the end of the year. Each holding will be worked as a small mixed farm. Each holding is of six acres and will be occupied by three pupils who will carry out all the work themselves under the supervision of the Agricultural Officer.

Bukalasa Farm School.

Two courses were held here during the first five months of the year. From 1st June until the end of the year no educational work could be undertaken at Bukalasa owing to the absence on leave of the Agricultural Officer concerned.

(a) A short course in Rural Science lasting one month, for secondary schoolmasters, was held during January. This was attended by sixteen secondary schoolmasters and thirteen pupils of Makerere College, who are being trained as teachers, making a class of twenty-nine in all.

This course is intended to give these men an insight into the aims and methods of the study of rural science. It is hoped that it will enable them to take an intelligent interest in the organising of their school gardens and of the teaching of nature study in their schools. A month's course is necessarily quite inadequate for this work, but at present accommodation is not available for a longer period.

(b) A twelve weeks' course for elementary teachers in Nature Study and Elementary Agriculture was held during March, April and May. This was attended by twenty-eight teachers.

This course included elementary botany, agriculture and entomology.

Model school gardens are kept up in connection with this course, and these are planned and cultivated by the class.

Five of these courses for elementary teachers have now been held. Without exception the pupils have been keen and anxious to learn. There was a tendency, noticeable in the earlier courses, for teachers to fail to appreciate the value of the outdoor work. It is satisfactory to note that the latter classes, including one under review, have shewn a better estimation of the relative values of classroom work and work out of doors.

During the year, twenty-five acres were set aside for small holdings for training natives who wish to learn to farm in a small way. Two holdings have been planned, one of fifteen acres and one of ten acres. It is intended to run the fifteen-acre holding as a small mixed farm using oxen, whilst the ten-acre holding will be worked with hand labour.

Schemes of cropping and all details of these holdings had been worked out before the end of the year, but as funds were not available until 1933, a start could not be made until the new year.

Makerere College Agricultural Course.

As in previous years the staff of this division has been responsible for the teaching of agriculture and agricultural subjects to these classes. (They are also responsible for teaching botany to the Medical and Veterinary classes as well as to those taking agriculture).

These subjects occupy part of the second year of the course and nearly the whole of the third year.

The third year class consisted of three pupils.

The course of instruction during the year included the following subjects:—

Agriculture.	Agricultural Chemistry.
Agricultural Botany.	Agricultural Entomology.

The pupils have their own plots on the Kampala Plantation and assist in keeping records of field trials and similar work.

During the year visits were paid to the following farms and institutions:—

Bukalasa Plantation; Serere Plantation; the Veterinary Department's Stock Farm at Kojja; the Veterinary Laboratory, Entebbe; the Botanic Gardens, Entebbe; Mr. Lea Wilson's farm at Mityana; Messrs. Buchanans' Estates, Kyagwe; Mr. W. G. Poole's estates, Kyagwe; Messrs. Nanji Kalidas' sugar estate and factory at Lugazi.

Thanks are due to the owners and managers of these estates for their kindness in allowing these visits and for the trouble they took in making the visits a success.

Messrs. Buchanans' Estates were kind enough to present, for a second time, a prize for the best essay written as a result of the visits to their estates.

Two of the three pupils passed their final examinations and so became eligible for entry on probation to the African Civil Service.

D. S. K. Sekinemye won the prize presented by the Honourable The Director of Agriculture for passing out top in agricultural subjects.

Arrangements were made for all three of these students to begin work under the Agricultural Department in 1933.

The second year class consisted of seven pupils. It is interesting to record that one of these is a Mugishu and one a Mutoro. As far as can be seen at this stage they are mostly of fair average intelligence.

This class attended the Agricultural Laboratories on two mornings a week for farm classes, in conjunction with which is given an elementary course of lectures and demonstrations in general agriculture; they attended on two afternoons a week for botany.

The syllabus of the Makereré Course in Agriculture has been carefully overhauled during the year, as it was felt that it would be to the advantage of the students to have a year's practical farming experience some time during their training.

After careful consideration, the course has now been lengthened to five years, as follows:—

First Year.—Continuation of general education.

Second Year.—Pure Science, including Physics, Chemistry, Botany, Zoology, and a continuation of Mathematics and English.

Third Year.—Mostly Applied Science, including Agricultural Botany, Agricultural Zoology, Plant and Animal Physiology, Elementary Agriculture, Agricultural Surveying, Book-keeping.

Fourth Year.—To be spent at one or more of the Agricultural Department's farms.

During this year the instruction will be entirely practical.

Fifth Year.—Advanced and Experimental Agriculture; Agricultural Entomology and Mycology; Animal Husbandry and Diseases of Stock; Economics.

In a few years' time, when the educational standard of pupils entering Makerere College has been raised, it should be possible to omit the first year of this course, thereby reducing the course to four years.

Arrangements have been made for the course under these new regulations to come into effect at the beginning of 1933.

The Inspection of Schools.

Experience has shown that the best results are only obtained from the Bukalasa and Serere courses for elementary teachers if these can be followed up by visits to teachers in their schools. The absence of two Agricultural Officers on leave for the last seven months of the year made it difficult to carry out these inspections as thoroughly as could be wished. Full use, however, was made of the two African Agricultural Assistants who were available. Practically all the elementary schools of the country were visited at least once during the year and some of them two, or even three times.

Nature study and school gardening are now an accepted part of the elementary school curriculum. The standard of teaching varies, of course, with the ability of the teacher, but on the whole the average standard, though not high, is decidedly better than a few years ago.

General.

A short course of instruction was given on the Kampala Plantation to coffee instructors from Kigezi district during January.

Parties of pupils have been taken round the Kampala Plantation and the museum of the Agricultural Laboratories at various times during the year.

Examinations conducted during the year have included Middle Schools (Botany), Normal Schools (Rural Science), and Elementary Schools (Nature Study).

As in past years the Honourable The Director of Education and his staff have done everything possible to make the co-operation of the two departments of practical value.

Thanks are due to the Director of Veterinary Services for his kindness in allowing visits to the institutions under his control and for allowing officers of his department to give lectures at various times.

E. G. STAPLES,
Superintendent, Agricultural Education.

ANNUAL REPORT ON TOBACCO DEVELOPMENT FOR THE YEAR 1932.

This report deals chiefly with the native tobacco industry in Bunyoro. As will be seen from the table given herewith, progress has been rapid and it should not be long before the 1,000,000 lbs. mark is reached.

Year.					Crop—lbs.		Value.	
							Shs.	Cts.
1927	1st Crop	...	...	...	1,631	...	427	00
	2nd "	(Failure owing to drought.)			—	...	—	—
1928	1st "	...	...	...	5,377	...	1,539	60
	2nd "	...	...	...	55,979	...	15,329	60
1929	1st "	...	...	...	89,316	...	23,581	20
	2nd "	...	...	...	48,656	...	11,831	70
1930	1st "	...	...	...	112,919	...	31,252	60
	2nd "	...	...	...	70,093	...	18,847	20
1931	1st "	...	...	...	367,041	...	90,869	80
	2nd "	...	...	...	36,467	...	9,013	10
1932	Crop	...	...	...	622,166	...	133,898	62

The value shewn represents the actual money paid to the growers.

2. *Types and Varieties Grown.*—The tobacco grown is all of the heavy fire-cured type.

For export purposes the variety "Blue Pryor" is used chiefly, but a little "Western" has also been exported.

For the B.A.T. Company the following varieties were grown to their requirements:—

Blue Pryor.	Piet Retief Swazie.
Hickory Pryor.	D.V.L.T.O.
Western.	

3. *1931.—2nd Crop.*—Planted in September, this small crop was purchased by the B.A.T. Company during March, 1932. The yield was very poor, the estimated acreage of 130 acres producing only approximately 36,000 lbs. of saleable leaf. Curing of this crop was, to a great extent, a failure.

4. *1932 Crop.*—Owing to the difficulty usually experienced in curing the autumn crop, because of the dry and windy weather which occurs during December and January, and also to the fact that the two crops rather overlapped, only one crop—the April planted—was grown during the year under review.

The acreage planted was estimated at 1,300 acres and the crop at approximately 520,000 lbs. Actually, the total crop, as purchased, amounted to 622,000 lbs.

It seems probable that the acreage was more than as estimated—no doubt due to a considerable amount of unauthorised planting.

The potential total was much more than this, as at least 40 acres were destroyed by hail and nine barns full of tobacco were accidentally burnt down during the curing process. The aggregate loss so caused must have been in the neighbourhood of 30,000 lbs.

Weather conditions during the season were far from ideal and were chiefly remarkable for the unusual number of hail storms experienced round about harvesting time. Hail occurrence was widely spread and caused great damage. Extremely wet weather during the curing made that operation difficult.

In spite of the above, the finished crop was extremely good and must rank as the best so far produced in Bunyoro, both as regards quantity and quality.

Grading was on the whole good and a decided improvement on previous crops, but still not entirely satisfactory. The percentages of grade 1 and grade 2 were 45.1 and 54.9 respectively. With a little more care on the part of the growers these figures could have been reversed.

Owing to the universal depreciation of tobacco values the prices were reduced by 3 cents per lb., the growers therefore receiving 27 cents and 17 cents per lb. for grades 1 and 2 respectively. The average price paid per lb. was 21.54 cents.

5. *Disease and Pests.*—Apart from the serious outbreak of "Mosaic" mentioned under section 9, the crop was very free of disease. A small portion was, however, attacked by "Red Rust" owing to the fact that it could not be harvested quickly enough and became over-ripe. The usual pests occurred but presented no serious difficulty.

6. *Disposal of Bunyoro Tobacco.*—Hitherto, the British-American Tobacco Company has purchased practically the whole of the crop for use in their local factory. The year under review, however, is notable for the fact that a considerable proportion of the crop was purchased by private individuals for direct export.

The crop was therefore disposed of as follows:—

B.A.T. Co.	...	...	...	Approximately 314,000 lbs.
Local Planters	...	...	...	267,000 "
Government	...	...	...	41,000 "

The 41,000 lbs. purchased by Government as surplus crop was later resold to a local planter.

7. *Bungoro Leaf Tobacco on the Home Market.*—In connexion with the export of our local leaf tobacco—which is somewhat experimental on the part of the exporters—it will be of general interest to record the results of the trial shipment made by Government.

For this experimental consignment, 13,127 lbs. of ordinary native crop leaf was purchased from the 1931 crop, at the then current prices of cents 30 and cents 20 for 1st and 2nd grades respectively. The leaf was regraded and packed at the Government tobacco packing factory at Masindi and the amount shipped was 7,716 lbs., consisting of 5,071 lbs. leaf tobacco and 2,645 lbs. strip tobacco. The loss in regrading and conditioning was therefore 5,411 lbs.

Of the 7,716 lbs. shipped, six bales and seven cases went to London and seventeen bales and nine cases to Liverpool. Up to the time of writing this report, the consignment to London had not been completely sold. The Liverpool consignment, however, was completely sold by the end of June, 1932, and resulted in a fair profit to Government. The average price realised for the whole consignment was a fraction over 11d. per lb., the highest price being 12½d. and the lowest 8½d. per lb.

Prices for leaf ranged from 12½d. to 10½d. per lb. and for strips from 10½d. to 8½d. per lb.

In reporting on the consignment, Messrs. Edwards, Goodwin & Co., state:—

“We are pleased to report that the packages arrived in excellent condition, and that all the tobacco in the bales and cases was well pressed in good, dry order, so that the tobacco has carried well, without making broken leaf and attendant smalls.”

They further reported that the moisture content ranged from 12·6 to 13·8 per cent. “which is entirely satisfactory.”

Reverting to the London consignment, it is interesting to note that advices of sales effected show that tobacco of the same grade and packing realized from 1½d. to 4½d. per lb. more on the London market than it did on the Liverpool market.

On the other hand, the brokers report:—

“The prices we have indicated to you (on their valuation) for the various grades are considered too high, and we are informed that the tobacco would not find favour on this market to any extent unless our prices were reduced by 1d. or 2d. per lb.”

Coming to the question of whether one should pack in bales or cases, it may be stated with regard to the Government consignment, that on the Liverpool market the prices realized per lb. were exactly the same for both packings. Writing on this subject, Messrs. Edwards, Goodwin & Co. say:—

“You will appreciate that it was impossible for us to ask any of our manufacturers to pay more for the tobacco packed in cases than in bales, and we therefore trust that no disappointment will be felt when comparing the results of the sale of the bales and cases. In this connection, however, we would state that the cases are preferred and they would be instrumental in assisting us to expand the market in Uganda tobaccos and to hold the trade which has already been established.”

Writing on the same subject with reference to the London consignment, Messrs. Clagett Brachi & Co. state:—

“Our clients all remark upon the improvement in the packing, but we are unable to report that any advantage has been found in the case of the tobaccos packed in wood. Whilst we have previously indicated that, as a rule, the cost of case-packing the tobacco is covered by the price obtained, therefore we are led to believe as a result of our clients' views that case packing would enable larger stocks to be entertained, as there would be no risk of deterioration of the tobacco in bond.”

The brokers quoted above valued the case-packed tobacco at 1d. per lb. more than the bale packed, and this premium more than covered the extra expense involved with case packing.

8. *Native Grown Tobacco in Districts other than Bunyoro.*—

(a) *Mubende District.*—As an experiment, a small area in this district was planted during October, 1931, for air-curing.

The crop grew quite satisfactorily, but the curing was not successful owing to insufficient supervision. The Tobacco Officer was only able to visit the area once during the season.

It was decided not to continue with the cultivation in this district until adequate supervision could be given.

(b) *West Nile District.*—The experimental cultivation commenced in this district during 1931 was continued during the year under review.

Approximately 30 acres were planted in April and May, but owing to extremely unfavourable weather conditions the crop proved more or less a failure and yielded only 1,973 lbs. of saleable tobacco.

9. *Tobacco Experiment Grounds, Bulindi.*—Work here during the year was directed almost exclusively to seed growing and selection work. Unfortunately, owing to a very heavy infection of mosaic disease the crop proved an entire failure and the necessary seed selection had to be carried out in various areas of the district.

The failure is attributed to the fact that the crop was planted on land that had already been under tobacco three or four times with practically no break. The whole of this old land has now been put under a green manure crop and next year it will be used for manurial and rotation crop experiments.

10. *Tobacco Conditioning and Packing Factory, Masindi.*—The factory built in 1931 and primarily erected so that the Government would be in a position, if necessary, to deal with any surplus crop, consists of two flue barns—each holding one ton of leaf—a boiler for generating steam, two steam chambers, press, and the necessary storage rooms, etc.

Up to November, 1932, very little use had been made of the factory. Following the purchase of part of the native crop for export, however, some of the exporters concerned made use of the facilities extended to them, whereby for a moderate charge they may have their tobacco conditioned and packed.

By the close of the year 250 bales, totalling $24\frac{1}{2}$ tons, of the current crop had passed through the factory, and it is expected that at least another 30 tons remain to be dealt with.

11. *European Cultivation.*—The estimated acreage under plantation-grown tobacco was 150 acres in Bunyoro and 140 acres in Buganda. In addition, a number of planters in other districts planted the crop on an experimental scale.

Where due care in grading and packing has been exercised, very fair prices have been obtained, though in common with most other products, tobacco prices have been generally lower than formerly.

Brokers' reports tend to shew that there has been a general improvement in packing as regards moisture content, but the fact that Uganda tobacco is regarded with suspicion on the home market—due, no doubt, to past errors—is apparent.

The greatest care in grading and packing is essential if Uganda tobacco is to hold the limited market it has already won. Only really sound well-bodied and well-cured leaf of wrapper quality should be sent to the home market, and strips, if exported at all, should also be of a wrappery nature.

C. HAZEL,

Plantation Manager.

IMPERIAL INSTITUTE,
LONDON, S.W. 7.

22ND DECEMBER, 1932.

REPORT ON GERANIUM OIL (*PELARGONIUM RADULA*) FROM UGANDA.

The sample of geranium oil which is the subject of this report was forwarded for examination to the Imperial Institute by the Director of Agriculture, and is referred to in his letter No. 2175/350 of the 25th August, 1932.

According to information supplied orally to the Imperial Institute by the Agricultural Chemist, Uganda, whilst home on leave, this sample of oil was distilled from plants of the same stock as the previous sample examined at the Imperial Institute in 1931. The latter was then described as derived from *Pelargonium capitatum*, but subsequently the plant was identified at Kew as *P. radula*. Both samples of oil are therefore from the latter species.

DESCRIPTION.

The sample, which weighed about 10 ozs., was pale yellow and slightly turbid owing to the presence of water. By filtration through paper the oil was rendered clear.

RESULTS OF EXAMINATION.

The oil was examined with the following results, which are shown in comparison with those obtained for the previous sample from Uganda dealt with in Imperial Institute report dated the 7th December, 1931. and with the corresponding figures recorded for commercial Algerian and Bourbon geranium oils:—

	<i>P. radula.</i>		Recorded figures for Commercial Oils.	
	Present Sample.	Previous Sample from Uganda.	Algerian.	Bourbon.
Specific Gravity at 15.5/15.5°C...	0.8941 ...	0.8956 ...	0.892 to 0.904 ...	0.888 to 0.896
Optical Rotation α _D ...	—15.83 at 22°C ...	—16.29 at 18°C ...	—6.5° to —12° ...	—7.7° to —13.8°
Refractive Index n _D 20°C ...	1.4718 ...	1.4719 ...	1.464 to 1.472 ...	1.461 to 1.468
Acid Value ...	8.7 ...	— ...	1.5 to 9.5 ...	1.5 to 12
Ester Value ...	22.5 ...	— ...	31 to 70 ...	50 to 78
Esters (expressed as geranyl tiglate) per cent. ...	9.5 ...	— ...	13 to 29.5 ...	21 to 23
Ester value after acetylation ...	214.2 ...	— ...	203 to 234 ...	206 to 233
Equivalent to total alcohols (expressed as geranial) per cent. ...	70.2 ...	— ...	66 to 78 ...	67 to 77.6
Solubility in 70 per cent. alcohol.	Soluble in 1.9 vols.	—	Soluble in 2 to 3 vols.	Soluble in 2 to 3 vols.

It will be seen from these figures that the physical constants of the present sample agree closely with those of oil previously examined. The oil was more strongly lævo-rotatory and contained a lower percentage of esters than normal Algerian and Bourbon geranium oils. The proportion of total alcohols was, however, fairly good.

The odour of the sample lacked the intense rose-like character of the Algerian and Bourbon oils, and was not so pleasant as that of the previous sample from Uganda. There was an objectionable subsidiary odour due probably to the presence of sulphur compounds, traces of which are also present in the French oils. It was found that partial oxidation of the oil by shaking it with a solution of hydrogen peroxide considerably improved its odour.

COMMERCIAL VALUE.

The oil was submitted to three firms of importers and two firms of essential oil distillers, who furnished the following reports:—

Importers.—

(a) "We think that there would be a demand for this grade of oil, and we ourselves are prepared to take a small quantity for trial purposes if it could be arranged. As regards the price, of course, the market fluctuates from time to time, but we should think the value would be somewhere about 8s. to 9s. per lb. in London."

(b) "We do not like the odour, and think that on this account alone it would be almost impossible to interest buyers. The physical constants as shown by your analysis are unlike either of the geranium oils of commerce. The specific gravity and refractive index are both high, and the optical rotation and ester value are very low. In these circumstances we cannot recommend any attempt to produce this oil on a commercial scale, for we are confident that it would be extremely difficult to find a market for it. For this reason we shall not attempt to place any value on it. If Uganda wishes to produce successfully a commercial geranium oil they will have to concentrate on the production of an oil which will compete with either the Bourbon or the Algerian oils which are the only important geranium oils in the market. If we may make a suggestion, we think that the Department of Agriculture in Uganda would get better results from *Pelargonium graveolens*."

(c) "We consider that this oil has some possibilities. Although it does not possess the intense odour of the Bourbon oil we consider it to be greatly superior to the geranium oil distilled in Kenya (sometimes described as Mawah oil), and if it could be produced to sell at about 10s. per lb. we think it might have possibilities."

Essential Oil Distillers.—

(a) "Our laboratory report that the odour of the raw oil is very poor indeed, but after saponification a sweet-smelling product is obtained. They add that the oil would not serve as a substitute for Bourbon geranium, but can be used as a source of rhodinol, which, however, would have to be offered as a different grade from the rhodinol obtained from Bourbon geranium oil."

(b) "The oil has a coarse, woody note, and could not replace Bourbon or Algerian oils on the market for use in compounding perfumed oils or for perfuming of soap."

REMARKS.

This geranium oil from Uganda is much inferior to the Algerian and Bourbon oils, and is more comparable in value with the "Mawah" geranium oil produced in Kenya. The latter oil only finds a limited market in the United Kingdom and is chiefly exported to the United States. It is possible that geranium oil represented by this sample from Uganda might find a similar outlet, but the value suggested (8s. to 10s. per lb.) is much less than that of the Algerian and Bourbon oils, which are at present quoted at about 23s. per lb. (spot) in London.

The examination at the Imperial Institute of samples of geranium oil from different sources has shown the importance of procuring the right material for planting, as many forms of the cultivated plant yield inferior oils for which it is difficult to find a market. The oil in greatest demand is that produced in Reunion (Bourbon) which is stated to be derived from a variety of *P. graveolens*, and efforts might be made to obtain a supply of this variety for trial in Uganda.

It is possible that the quality of the oil could be improved by postponing the distillation of the plants for a certain time after harvesting. It is stated that in Reunion the cut plants are kept for 24 hours before distillation, and that the slight fermentation which takes place improves the quality of the oil obtained.

IMPERIAL INSTITUTE,
LONDON, S.W. 7.

22ND DECEMBER, 1932.

REPORT ON PATCHOULI OIL FROM UGANDA.

The sample of patchouli oil which is the subject of this report was forwarded for examination to the Imperial Institute by the Director of Agriculture, and is referred to in his letter No. 2175/350 of the 25th August, 1932.

DESCRIPTION.

The sample weighed about 10 ozs. and consisted of pale, greenish-yellow, slightly turbid oil. By filtration through paper the oil was rendered clear.

RESULTS OF EXAMINATION.

The oil was examined with the following results, which are shown in comparison with the figures obtained for the previous sample from Uganda dealt with in Imperial Institute report dated the 7th December, 1931, and with the corresponding figures recorded for commercial Singapore and Java patchouli oils:—

	<i>Present sample.</i>	<i>Previous sample from Uganda.</i>	<i>Figures recorded for Oils from Singapore.</i>	<i>Java.</i>
Specific Gravity at 15.5/15.5°C	0.9271	0.9443	0.960 to 0.985	0.925 to 0.935
Optical Rotation α_D ... —1.3° at 21°C	...	—12.6° at 20°C	—45° to —65°	—3° to —33°
Refractive Index n_D 20°C	1.5021	1.5048	1.5080 to 1.5120	1.5000 to 1.5080
Acid Value ...	0.3	—	—	—
Ester Value ...	5.8	—	1.5 to 7	6 to 20
Solubility in 90 per cent. alcohol.	Soluble in 7 vols.	Slightly turbid with 7 vols., not entirely soluble with 10 vols.	Usually soluble in 3 to 10 vols. Some oils in 1 vol. or less.	Soluble in up to 10 vols.

The constants of the present oil differ somewhat from those found for the previous sample, and agree with those recorded for normal Java patchouli oil. The odour and solubility of the oil were more satisfactory than those of the previous sample.

COMMERCIAL VALUE.

The oil was submitted to three firms of importers and two firms of essential oil distillers, who furnished the following reports:—

Importers.

(a) "It is quite likely that this oil would compete favourably with the Java oil, but we ourselves have not found such demand for the latter product. The perfumery houses invariably stipulate for Singapore oil, owing to its solubility and high gravity. Nevertheless, there may be certain productions in which this oil could be used, provided the price was at a favourable level."

(b) "The sample, we regret to say, is undoubtedly a very inferior oil. The odour is bad and we are quite sure there would be the greatest difficulty in interesting buyers in it. The analysis shows it to be similar to Java patchouli oil, but it is so very inferior to it in odour that there would not be any hope of its being able to compete with that oil. For these reasons we cannot recommend the production of an oil similar to this sample on a commercial scale, and we regret that in this instance we are unable to make any helpful suggestions."

"The production of patchouli oil appears to be increasing. For example, the Seychelles Islands are now exporting to this country at least more oil than they have ever done before. Meanwhile supplies from Singapore, which has always been the more important centre of production, are fully maintained."

(c) "This oil has an unusual odour quite different from the ordinary patchouli oils of commerce. In fact, its odour could almost be described as unpleasant and we do not think that it is likely to find much demand, especially in view of the fact that other patchouli oils are in plentiful supply at unprecedentedly low prices."

Essential Oil Distillers.—

(a) "The odour of this oil is apparently quite clean but rather thin and distinct from that of Singapore or Seychelles patchouli."

(b) "With regard to this oil, it is of very inferior odour compared with that distilled in this country from imported leaves, or that imported as such. There is no oil on the market which it could supersede, and hence its commercial value would be very low."

REMARKS.

The results of this investigation suggest that the patchouli plants which are being grown in Uganda yield an oil of relatively poor quality and value. It is very doubtful whether it would be profitable to produce such oil on a commercial scale.

Patchouli oil to be readily marketable should approach the quality of the Singapore product, which is taken as a standard in the trade and is at present quoted in London at about 9s. per lb. (spot). The best oils usually possess a high specific gravity and are soluble in an equal volume (or less) of 90 per cent. alcohol.

The fact that the present sample of Uganda oil resembles the Java oil in character suggests that the plants now being cultivated were obtained from the latter country. If this be so, it would be desirable to procure a supply of the plants yielding the Singapore oil for trial cultivation and distillation in Uganda.

IMPERIAL INSTITUTE,

LONDON, S.W. 7.

22ND DECEMBER, 1932.

REPORT ON CINNAMON LEAF OIL FROM UGANDA.

The sample of cinnamon leaf oil which is the subject of this report, was forwarded to the Imperial Institute by the Director of Agriculture, and is referred to in his letter No. 2175/350 of the 25th August, 1932.

DESCRIPTION.

The sample, which weighed about 10 ozs., was reddish-brown and slightly turbid owing to the presence of water. By filtration through paper the oil was rendered clear.

RESULTS OF EXAMINATION.

The oil was found to have the following constants as compared with those of samples of cinnamon leaf oils from Seychelles examined at the Imperial Institute and the recorded range for Ceylon cinnamon leaf oil :—

		<i>Present sample.</i>	<i>Seychelles Cinnamon Leaf Oil.</i>	<i>Recorded figures (Gildemeister).</i>
Specific Gravity at 15.5/15.5°C	...	1.0477	1.046 to 1.060	1.044 to 1.065
Optical rotation α_D	...	+1.3° (approx., solution very dark) at 22°C.	—2.06° to +0.25°	—0° 15' to +2° 20'
Refractive Index n_D 20°C	...	1.5364	1.532 to 1.539	1.531 to 1.540
Total phenols (as eugenol), per cent.	...	69.5	86 to 92	65 to 95
Aldehydes (bisulphite method), per cent.	...	5.5	0.5 to 6.5	up to 4
Solubility in 70 per cent. alcohol	...	Soluble in 1.6 vols. No turbidity on further dilution.	Soluble in 1.1 to 1.5 vols. No turbidity on further dilution.	Soluble in 1 to 3 vols. Sometimes becoming turbid on further dilution.

The present sample of cinnamon leaf oil is similar in character to the oil distilled in Ceylon and Seychelles, but it contains a rather lower percentage of eugenol than average samples of the commercial oils.

COMMERCIAL VALUE.

Cinnamon leaf oil is used principally as a source of eugenol for the manufacture of vanillin. The bulk of the commercial oil goes to the United States where it is admitted free of duty. Owing to the steadily increasing competition of vanillin made from guaiacol during recent years the value of cinnamon leaf oil has declined, and moreover at the present time this oil has to compete with Madagascar clove oil as a source of eugenol. The latter oil is now quoted in London at 3s. per lb. c.i.f., on a basis of 85 per cent. of eugenol.

Another factor in this connection is that clove oil is more suitable than cinnamon leaf oil for vanillin manufacture, as the constituents other than eugenol in the latter oil render the vanillin more difficult to purify than the vanillin produced from clove oil.

Cinnamon leaf oil is at present quoted in London at 2s. 5d. per lb. c.i.f., and this oil from Uganda containing only 70 per cent. of eugenol would probably realise rather less than this price.

IMPERIAL INSTITUTE,
LONDON, S.W. 7.
22ND DECEMBER, 1932.

REPORT ON LEMONGRASS OIL FROM UGANDA.

The sample of lemongrass oil which is the subject of this report was forwarded to the Imperial Institute by the Director of Ariculture, and is referred to in his letter No. 2175/350 of the 25th August, 1932.

DESCRIPTION.

The sample, which weighed about 10 ozs., was pale yellow and slightly turbid owing to the presence of water. By filtration through paper, the oil was rendered clear.

RESULTS OF EXAMINATION.

The oil was found to have the following constants as compared with those of the sample of *Cymbopogon citratus* oil from Uganda dealt with in Imperial Institute report of the 7th December, 1931, and with recorded figures for *Cymbopogon citratus* oil:—

	Present Sample.		Previous Sample.		Recorded Figures.
Specific gravity at 15·5/15·5°C	...	0·8846	...	0·9178	0·870 to 0·912
Optical rotation α_D	...	−0·21° at 22°C	...	+1·43° at 20°C	−1° to +0°12'
Refractive index n_D 20°C	...	1·4859	...	1·4913 at 20°C	1·482 to 1·489
Citral (normal sulphite method), per cent.	...	74·5	...	72·0	—
Citral (bisulphite method), per cent.	...	77	...	—	53 to 83
Solubility in 80 per cent. alcohol	...	Insoluble even in 12 vols.	...	—	Sometimes soluble, sometimes insoluble.

This oil is of rather better quality than the sample of lemongrass oil previously examined, and the above figures show that its characters are in agreement with those usually found for lemongrass oil derived from *Cymbopogon citratus*. The commercial value of the oil would be similar to that of Cochin lemongrass oil, distilled from *C. flexuosus*, the present price of which in London is 2s. 3d. per lb. c.i.f.

IMPERIAL INSTITUTE,
LONDON, S.W. 7.
11TH FEBRUARY, 1932.

REPORT ON VANILLA FROM UGANDA.

The ten samples of vanilla which are the subject of this report were forwarded to the Imperial Institute by the Director of Agriculture and are referred to in his letter No. 2838/350 of the 7th December, 1931.

The samples were stated to represent vanilla pods produced on an estate at Entebbe, five of them having been cured at Entebbe and the other five at Kampala.

DESCRIPTION.

The external characters of the samples are given in the following table:—

(a) Cured at Kampala.—

Sample.	Weight. ozs.	Colour.	Length of Pods. inches.	Width of Pods. inches.
1	2½	Brown to dark chocolate brown	6¾	3/16th to 5/16th
2	2	Dark chocolate brown	5¾	3/16th to 1/4th
3	4	Brown to dark chocolate	5¾	3/16th to 5/16th
4	4	Dark brown to dark chocolate brown	6½	1/4th to 3/8th
5	2	do do do	4¾	1/8th to 5/16th

(b) Cured at Entebbe.—

A	2½	Dark chocolate brown	6	3/16th to 3/8th
B	3	Brown to dark chocolate brown	6	3/16th to 5/16th
C	2½	do do do	5¾	3/16th to 3/8th
D	1½	do do do	4½	3/16th to 5/16th
E	1¼	do do do	4	1/8th to 1/4th

The odour of the samples was in all cases lacking in intensity, and poor in comparison with that of Bourbon and Madagascar vanilla; the larger and fatter pods possessed a better aroma than the smaller pods, probably because the latter were generally drier. No. 4, which contained some of the longest and fattest pods, had a somewhat stronger odour than the other samples; this was the only sample in which crystallisation was observed, but it occurred to a very slight extent only.

COMMERCIAL VALUE.

The samples were submitted to a firm of importers in London, who described them as too dry and deficient in aroma. They considered that the dryness might possibly be due to the bundles having been wrapped in paper, instead of in tinfoil in accordance with the usual commercial practice. They stated that in view of the competition of cheap synthetic vanillin the only grade of vanilla pods which it is now possible to market readily are those of high quality.

The firm were of opinion that the largest pods among the present samples might be saleable in London at 3s. 6d. per lb. under existing market conditions, with Bourbon vanilla of much stronger and superior odour quoted at 8s. to 9s. 6d. per lb. They themselves, however, would not deal in vanilla of the quality of the Uganda samples.

As regards the external characters of the pods, the firm considered the colour to be satisfactory, but they pointed out that the length of vanilla pods offered on the United Kingdom market must be between six and eight inches, so that from this point of view, samples 5, *D* and *E* would be unacceptable to the trade.

IMPERIAL INSTITUTE,
LONDON, S.W. 7.

14TH MARCH, 1933.

REPORT ON MUJAJA OMUNENE (*OCIMUM SP.*) OIL FROM UGANDA.

The sample of oil which is the subject of this report was forwarded for examination to the Imperial Institute by the Director of Agriculture, and is referred to in his letter No. 2618/350 of the 17th October, 1932.

DESCRIPTION.

The sample consisted of 8 ozs. of oil which was turbid owing to the presence of moisture. After filtration through paper it was clear and of pale yellow colour.

RESULTS OF EXAMINATION.

The oil was examined with the following results, which are shown in comparison with the corresponding figures obtained for the previous sample which was the subject of Imperial Institute report of the 7th December, 1931:—

			<i>Present sample.</i>	<i>Previous sample.</i>
Specific gravity at 15.5/15.5°C	...	...	0.8955	0.9117
Optical rotation α_D	...	...	-4.25° at 18°C	-20.21° at 16°C
Refractive index n_D 20°C	...	...	1.4941	1.5040
Acid value	...	...	1.1	—
Aldehydes and/or ketones (by normal sulphite method), per cent.	...	...	1.0	—
Phenols (by absorption), per cent.	...	...	26.5	24
Solubility in 90 per cent. alcohol at 15.5°C	...	...	...Soluble in 0.4 vol.	—

The following constants were also determined for the present sample, on the phenol-free oil:—

Ester value	...	...	...	10.1
Ester value after acetylation	...	...	...	20.5
Specific gravity at 15.5/15.5°C	...	...	...	0.869

The phenols were removed from a portion of the sample by shaking it with a five per cent. solution of caustic potash. From the alkaline solution of the phenols so obtained some of the phenols were extracted by means of ether. After removal of the ether this portion was frozen by means of solid carbon dioxide, the crystals so obtained remaining solid on reaching room temperature. These crystals possessed the characteristic odour of thymol, and after purification by crystallisation from light petroleum melted at 49.5/50.5°C (Gildemeister gives the melting point of thymol as 50.5/51.5°C).

The phenols not extracted by the ether from the alkaline solution were liberated by means of dilute hydrochloric acid and found to possess the clove-like odour of eugenol. The presence of eugenol was confirmed by the preparation of the benzoyl compound melting at 69°C. Small quantities of other phenols were also present.

COMMERCIAL VALUE.

The oil was submitted to (a) essential oil distillers, and (b) soap manufacturers, who furnished the following observations:—

(a) "This is a very fine oil of the thyme oil type. The thymol content is too low for profitable extraction, but the oil should be very acceptable to soap-makers. It is difficult to put a value on the oil but we think that it would be somewhere round about that of a good type of white thyme oil."

(b) "This oil might be described as a variant of the ordinary red thyme oil of commerce, and it possesses no characteristics which would make it of greater value than one of the lower-grade oils of this class. We have compared it with one of these oils, costing to-day 3s. 3d. per lb., and find it to be less powerful and not so persistent in odour. It does keep well, however, and is not so prone to discolouration on exposure. We find difficulty in suggesting a better market value for it than about 2s. 6d. per lb."

REMARKS.

The results of examination indicate that the present oil is of similar character to the previous sample dealt with in Imperial Institute report of the 7th December, 1931, although it exhibits a considerably lower *lævo*-rotation. The more detailed investigation which it has now been possible

to carry out has shown that the phenolic portion of the oil, which the odour of the oil suggested was composed essentially of eugenol, also contains an appreciable proportion of thymol.

The low specific gravity of the phenol-free oil, and the low ester value after acetylation, which would be equivalent to only about four per cent. of "total alcohols" (calculated as $C_{10}H_{18}O$) in the original oil, confirm the opinion previously expressed that the non-phenolic portion of the oil consists principally of terpenes.

As indicated above the oil might perhaps be saleable for soap perfumery at a price of 2s. 6d per lb. It does not, however, contain a sufficient amount of thymol or eugenol to render the extraction of these constituents remunerative.

IMPERIAL INSTITUTE,
LONDON, S.W. 7.
14th MARCH, 1933.

REPORT ON OIL OF *COLEUS* SP. FROM UGANDA.

The sample of oil which is the subject of this report was forwarded for examination to the Imperial Institute by the Director of Agriculture, and is referred to in his letter No. 2618/350 of the 17th October, 1932. It was stated to represent the essential oil of a fleshy-leaved species of *Coleus*.

DESCRIPTION.

The sample consisted of 8 ozs. of oil which was turbid owing to the presence of moisture. After filtration through paper it was clear and of pale yellow colour.

RESULTS OF EXAMINATION.

The oil was found to have the following constants :—

Specific Gravity at 15·5/15·5°C	...	...	...	...	0·8939
Optical Rotation α_D	...	...	...	...	−20·33° at 19°C
Refractive Index, n_D 20°C	...	...	...	...	1·4940
Acid Value	...	...	...	...	0·7
Aldehydes and/or ketones (by the bisulphite method), per cent.	...	...	...	...	2·5
Phenols (by absorption), per cent.	...	...	...	...	6·0
Solubility in 90 per cent. alcohol at 15·5°C	...	...	...	...	Not completely soluble even in 10 vols.
* Ester Value	...	...	...	...	7·6
* Ester value after acetylation	...	...	...	...	35·0

* Determined on the phenol-free oil.

The phenols were extracted from a portion of the sample by shaking with a five per cent. solution of caustic potash. Most of the phenols in the alkaline solution could be removed by direct extraction with ether. This portion, which possessed a thymol-like odour, did not completely congeal when cooled with solid carbon dioxide. This suggested that the odour was due to carvacrol which, when pure, melts at +0·5° to +1°C. The presence of carvacrol was confirmed by the preparation of the crystalline nitroso-compound, melting at 153°C.

The quantity of phenols not extracted by means of ether from the alkaline solution was insufficient for complete examination and identification.

COMMERCIAL VALUE.

The oil was submitted to (a) essential oil distillers, and (b) soap manufacturers, who furnished the following observations :—

(a) "This oil is of little interest and is unlikely to find favour here except for the cheap soap trade."

(b) "Products containing this oil developed a peculiar fusty odour which would be difficult to cover, and as the oil is also weaker in odour than is desirable we are doubtful if it will be possible to find a place for it on the market."

REMARKS.

This oil possessed a rather pleasant thyme-like odour which, however, was not strong enough to render the oil of much value for perfumery purposes. The general odour suggested the presence of a large proportion of terpenes, and this is also indicated by the low solubility, and by the chemical constants, which show the presence of only very small amounts of esters, alcohols, aldehydes and phenols. The figure obtained for the ester value after acetylation is equivalent to only 9·3 per cent. of "total alcohols" (calculated as $C_{10}H_{18}O$) in the original oil.

Carvacrol is employed as a substitute for thymol, but there is only a limited demand for it, and the small amount present in this oil would not be worth extraction.

IMPERIAL INSTITUTE,

LONDON, S.W. 7.

14TH MARCH, 1933.

REPORT ON KAWAMALA (*COLEUS SP.*) OIL FROM UGANDA.

The sample of oil which is the subject of this report was forwarded for examination to the Imperial Institute by the Director of Agriculture, and is referred to in his letter No. 2618/350 of the 17th October, 1932.

DESCRIPTION.

The sample consisted of 8 ozs. of oil which was turbid owing to the presence of moisture. After filtration through paper it was clear and of pale yellow colour.

RESULTS OF EXAMINATION.

The oil was examined with the following results, which are shown in comparison with the corresponding figures obtained for the previous sample of Kawamala oil which was the subject of Imperial Institute report of the 7th December, 1931:—

		<i>Present sample.</i>	<i>Precious sample.</i>
Specific gravity at 15.5/15.5°C	...	0.8815	0.8859
Optical rotation α_D	...	+29.93° at 19°C	+43.0° at 16°C
Refractive index n_D 20°C	...	1.4808	1.4828
Acid value	...	0.6	—
Ester value	...	18.3	—
Ester value after acetylation	...	42.3	—
Aldehydes and/or ketones (by the bisulphite method), per cent.	...	3.5	—
Phenols (by absorption), per cent.	...	1.5	—
Solubility in 90 per cent. alcohol at 15.5°C	...	Not completely soluble even in 10 vols.	—

COMMERCIAL VALUE.

The oil was submitted to (a) essential oil distillers and (b) soap manufacturers, who furnished the following observations:—

(a) "This oil is of little interest and is unlikely to find favour here except for the cheap soap market."

(b) "The oil is difficult to describe and recalls in its odour a mixture of the terpenes obtained from oils containing cineol and thymol, to which is added a suggestion of the spicy odour of nutmeg. Such a mixture would approximate quite closely to the odour of this oil. Its market price would be low, probably less than 2s. per lb."

REMARKS.

The present sample was of similar odour and character to the Kawamala oil examined in 1931, but it showed a considerably lower optical rotation. The odour, low solubility and low specific gravity indicate that the oil consists largely of terpenes. The figure obtained for the ester value after acetylation is equivalent to about 12 per cent. of "total alcohols" (calculated as $C_{10}H_{18}O$) in the original oil.

The results of examination show that the oil would only be marketable at low price for soap manufacture, and that it contains no constituents of commercial value in sufficient quantity to be worth extracting.

Livestock, 1932.

Appendix No. 3

PROVINCE AND DISTRICT.		Cattle.	Sheep.	Goats.	Swine.	Horses.	Donkeys.	Mules.
BUGANDA :—								
Mengo	...	61,364	27,139	221,494	400	2	...	...
Entebbe	...	23,560	11,154*	52,684	200	4	...	...
Masaka	...	100,000†	10,612*	38,173	100	...	...	...
Mubende	...	31,395	12,110	85,716	25	...	...	...
TOTAL	...	216,319	61,015	398,069	725	6	...	...
EASTERN :—								
Busoga	...	117,427	49,803	249,244	...	...	2	...
Budama	...	88,198	24,272	63,915	...	...	45	...
Bugwere	...	110,033	27,427	117,132	...	...	8	...
Bugishu	...	165,758	69,261	150,734	...	...	44	...
Teso	...	361,674	49,150	130,055	...	...	13	...
Karamoja	...	150,000	160,000*	85,000	...	...	15,000	3
TOTAL	...	993,090	379,913	796,080	...	...	15,112	3
NORTHERN :—								
Lango	...	327,577	84,976	161,324	...	...	10	...
Bunyoro	...	6,989	13,934	58,063	...	...	...	...
Gulu	...	43,040	12,851	30,365	...	...	...	...
Chua	...	38,422	10,948	27,510	...	...	...	...
West Nile	...	188,509	35,090	161,050	...	...	...	...
TOTAL	...	604,537	157,799	438,312	...	...	10	...
WESTERN :—								
Toro	...	62,091	46,795	96,289	...	...	15	...
Ankole	...	183,341	98,420*	155,405	20	...	5	...
Kigezi	...	92,290	100,000*	140,000	...	...	2	...
TOTAL	...	337,722	245,215	391,694	20	...	22	...
GRAND TOTAL	...	2,151,668	843,942	2,024,155	745	6	15,144	3

* 1931 Census—no later figures available.

† Approximate figures.

European Agriculture, 1932.

Appendix No. 4

Province and District.	Number of Estates.	Total Acreage taken up.	Total Acreage cultivated.	Coffee.		Para Rubber.	Tea.	Cotton.	Tobacco.	Miscellaneous.	
				Arabica acres.	Robusta acres.						
BUGANDA :—											
Mengo	76	34,651	13,194	2,558	4,191	7,574	388	54	94	302	
Entebbe	18	6,796	2,315	391	598	1,369	75	36	...	4	
Masaka	22	6,925	1,426	856	310	260	20	...	...	...	
Mubende	12	5,710	1,185	967	185	20	208	1	46	...	
TOTAL	128	54,082	18,120	4,772	5,284	9,223	691	91	140	306	
EASTERN :—											
Busoga	7	8,187	926	531	430	15	...	...	...	160	
WESTERN :—											
Toro	67	26,851	3,599	3,474	45	...	30	20	...	60	
NORTHERN ;—											
Bunyoro	24	13,037	3,228	1,659	590	1,045	...	...	84	136	
West Nile	2	400	100	50	...	...	...	...	30	20	
GRAND TOTAL	228	102,557	25,973	10,486	6,349	10,283	721	111	254	682	

2,913 acres are interplanted areas.

Returns were received from 159 estates.

Returns were not received from 69 estates, and regarding these estates, figures from previous returns have been included in respect of the permanent crops.

33 estates in the above, comprising 11,123 acres, have no cultivation, are abandoned, or have been presumed abandoned.

The above acreage of para rubber includes areas denoted as closed but which may be re-opened if tapping becomes economic.

Asiatic Agriculture, 1932.

Appendix No. 5

Province and District.	Number of Estates	Total Acres Under Cultivation	Total Acres Cultivated	Coffee		Para Rubber	Sugar Cane	Sisal	Miscel- laneous	
				Acres						
				1931	1932	1931	1932	1931	1932	1931
BUGANDA :—										
Mengo	... 20	15,700	6,177	80	236	310	5,590	...	61	
Entebbe	... 8	2,393	10	...	...	...	...	...	10	
Masaka	... 4	2,403	413	5	75	170	110	...	53	
Mubende	... 4	2,497	221	180	10	10	...	...	21	
TOTAL	... 36	22,993	6,821	265	321	490	5,700	...	145	
WESTERN :—										
Toro ...	... 2	585	74	74	...	...	...	...	...	
NORTHERN :—										
Bunyoro	... 2	5,099	1,310	...	...	...	...	1,300	92	
EASTERN :—										
Busoga	... 9	14,193	5,425	25	40	700	4,660	...	...	
GRAND TOTAL	... 49	42,870	13,630	364	361	1,190	10,360	1,300	237	

182 acres are interplanted areas.

Returns were received from 39 estates.

Returns were not received from 19 estates, and regarding these estates, figures from previous returns have been included in respect of permanent crops.

24 estates in the above, comprising 10,824 acres, have no cultivation, are abandoned, or have been presumed abandoned.

Appendix No. 6

Comparative Statement of Uganda Produce Exported.

FOR THE YEAR ENDED 31ST DECEMBER, 1932.

ARTICLES.	Unit of Quantity.	From 1st January to 31st December, 1931.		From 1st January to 31st December, 1932.		INCREASE.		DECREASE.	
		Quantity	£	Quantity	£	Quantity	£	Quantity	£
Maize	...	603	85	1,440	204	836	204	...	...
Other grain	...	1,502	177	120	36	...	...	1,382	140
Peas and beans	...	339	148	34	94	...	...	305	34
Meat and flour	...	...	...	...	...	...	...	...	...
Cake, oil seed, other	...	37	139	226	831	189	692	...	...
Chillies	...	2,814	5,315	2,235	3,866	...	...	579	1,649
Coffee, raw	...	69,990	161,389	87,077	223,162	17,087	61,773	...	...
Ghee	...	23	56	21	71	...	15	2	...
Salt, other	...	1,192	487	1,460	304	268	487	...	...
Sugar, refined	...	44,995	46,576	41,049	45,012	...	...	3,946	1,564
Tea	...	26	130	117	567	91	437	...	...
Other articles of food and drink	...	...	230	...	238	...	38	...	...
Cigarettes	...	46,474	12,345	67,300	18,190	20,826	5,845	...	...
Tobacco, manufactured	...	275	45	6,353	1,045	6,078	1,000	...	...
unmanufactured	...	153,322	3,140	153,794	6,925	20,472	1,785	...	...
Timber, hewn or sawn	...	3,697	725	9,738	2,245	6,041	1,520	...	...
Tin ore	...	170	24,436	335	47,168	165	22,732	...	...
Cotton, raw	...	755,680	1,500,000	850,000	1,684,071	94,320	184,071	...	...
Seed, cotton	...	45,435	149,224	56,311	168,366	10,876	19,142	...	...
Seed, sesame	...	350	3,799	3,597	43,363	3,247	39,564	...	...
Groundnuts	...	215	2,076	1,455	16,232	1,240	14,156	...	...
Oil, sesame	...	320	48	688	80	368	32	...	...
Hides, dry and dry salted	...	19,799	36,696	15,722	27,682	...	...	4,577	9,014
Skins, sheep and goat	...	130,670	5,226	175,094	6,588	42,424	1,362	...	...
other animal	...	577	42	415	38	...	...	162	4
Hippopotamus teeth	...	5	21	55	405	50	384	...	...
Ivory, elephant	...	405	16,184	526	21,547	121	5,363	...	...
Rhinoceros horns	...	...	30	2	164	2	134	...	...
Aluminium hollow-ware	...	1	125	2	306	1	181	...	...
Methylated spirits	...	1,354	254	1,635	238	339	...	...	16
Animals, not for food	...	13	5	7	36	...	31	6	...
Other articles	...	...	2,374	...	1,488	...	...	...	...
Grand total	...	...	...	...	...	...	...	...	...
TOTAL	£	1,978,262	3,224,878	300,842	14,226				

Net increase—£244,616.

Comparative Statement of Exports from the Uganda Protectorate.

ARTICLES.	Unit of Quantity.	Year ended 31st December, 1928.		Year ended 31st December, 1929.		Year ended 31st December, 1930.		Year ended 31st December, 1931.		Year ended 31st December, 1932.	
		Quantity	£	Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£
Maize	Cent.	...	...	9,925	3,882	560	128	603	85	1,439	294
Other grain	"	27	34	19	18	191	111	1,232	175	120	36
Pulse and beans	"	29	19	82	54	1,596	844	359	148	341	94
Meal and flour	"	412	192	917	502	1,554	676	...	...	10	8
Cake, oil seed, other	Ton	136	847	74	495	206	1,180	37	139	226	831
Chilies	Cent.	4,437	25,848	6,175	26,134	3,078	7,573	2,811	5,515	2,235	3,866
Coffee, raw	"	10,318	164,188	11,199	177,135	48,856	151,396	63,990	161,389	87,077	223,162
Cheese	"	31	239	62	475	10	52	23	56	21	71
Salt, other	"	...	...	...	...	...	...	...	...	...	...
Sugar, refined	"	2,749	1,435	4,276	7,071	6,669	8,719	1,192	46,576	3,460	934
Tea	"	1	8	12	133	9	84	26	130	117	567
Other articles of food and drink	Value	...	308	347	3,066	...	399	...	...	...	...
Tobacco and cigarettes	Lb.	8,559	330	62,081	...	144,367	10,949	...	220	...	258
Cigarettes	"	...	...	...	...	...	...	...	...	...	...
Tobacco, manufactured	"	...	...	...	...	...	...	...	...	...	...
Timber, hewn or sawn	Cent. of 100 lbs	1,913	609	3,533	1,161	2,501	602	46,474	12,345	67,300	18,190
" unmanufactured	"	252	50,673	324	63,900	...	...	275	45	6,353	1,045
Tin ore	"	533,911	2,175,358	816,228	3,312,668	316,189	1,353,544	133,322	5,140	159,794	6,925
Cotton, raw	Ton	43,507	323,109	67,525	423,999	33,578	137,587	3,697	725	9,738	2,245
Seed, cotton	"	176	2,163	1,339	21,891	1,116	17,963	...	...	...	...
" sesame	"	150	2,636	316	5,413	1,289	15,123	215	2,076	1,455	16,232
Groundnuts	Imp. gall.	1,536	422	1,678	464	2,522	467	320	48	688	80
Oil, sesame	Cent.	58,364	257,287	35,099	152,543	21,493	49,519	19,799	36,696	16,222	27,682
Hides, dry and dry salted	No.	103,042	8,038	258,015	12,901	205,200	7,670	130,670	5,226	173,094	6,588
Skins, sheep and goat	"	...	...	...	...	...	...	...	...	...	...
Skins, other animal	"	202	13	78	50	5	10	577	42	415	38
Rubber, plantation, raw	Cental of 100 lbs.	11,311	54,978	8,234	28,818	6,270	16,814	...	...	...	...
Hippopotamus teeth	Cent.	1	4	3	17	11	48	...	21	55	405
Ivory, elephant	"	330	21,758	405	24,758	302	13,533	405	16,184	526	21,547
Rhinoceros horns	"	3	722	2	640	26	1,619	...	30	2	164
Aluminium hollow-ware	"	...	...	...	...	...	...	...	125	2	303
Methylated spirits	Imp. gall.	543	93	1,418	288	1,213	218	1,854	204	1,693	238
Animals, not for food	No.	...	...	2	2	22	301	13	5	7	36
Other articles	Value	...	989	...	2,933	...	2,724	...	3,274	...	1,483
Gold bullion	Oz. tray	...	...	...	...	...	...	69	990	569	3,470
TOTALS	...	...	3,895,270	...	4,274,758	...	2,060,453	...	1,978,262	...	2,224,878

Details of Machinery at Gineries in the Uganda Protectorate, 1932 Season.

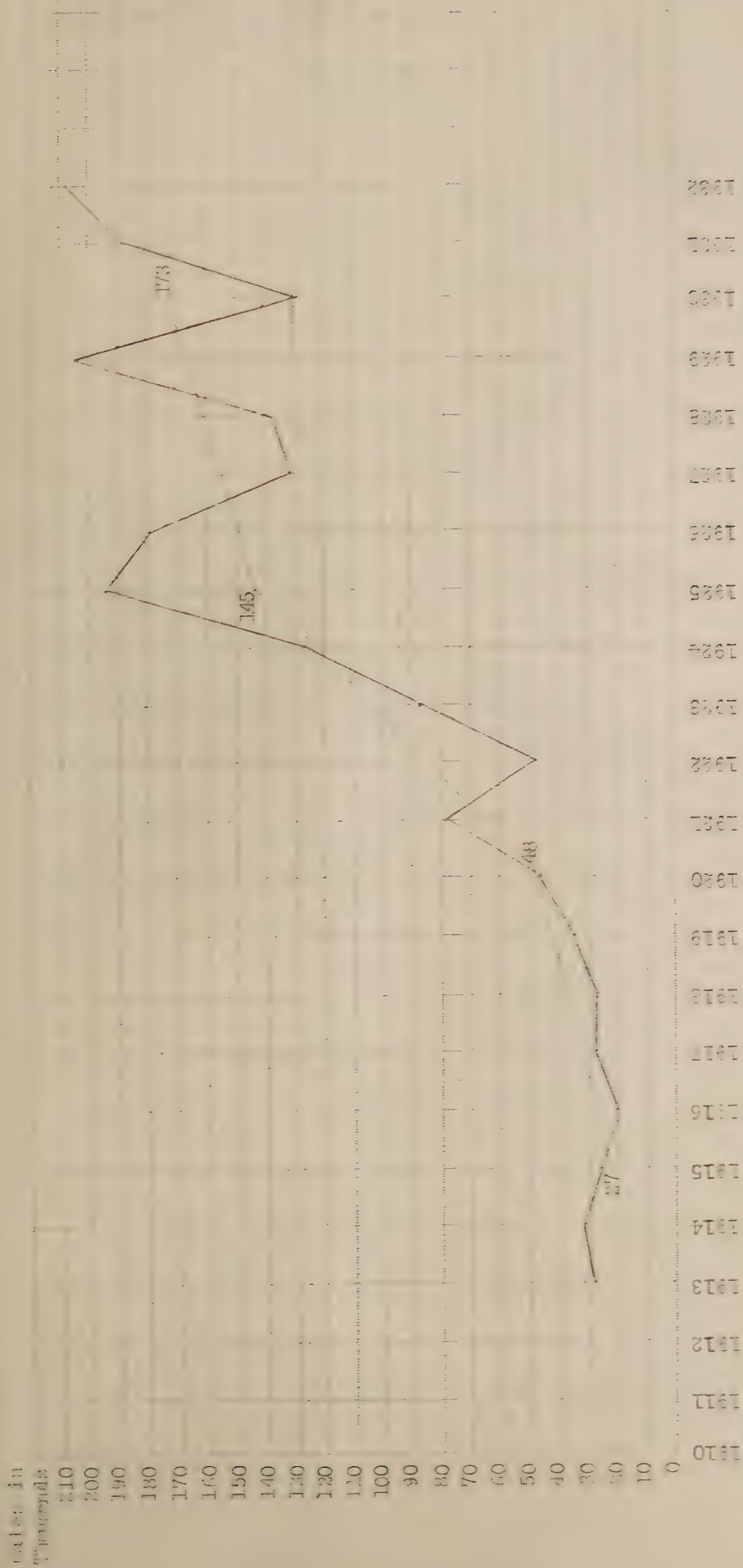
Province and District.	Ginneries.				Gins.				Seed Openers.				Presses.				Engines.											
	Working.		Roller.		Working.		Saw.		Working.		Silent.		Working.		Power.		Working.		Steam.		Working.		Oil.		Working.		Suction Gas.	
			Working.	Silent.			Working.	Silent.			Working.	Silent.			Working.	Silent.			Working.	Silent.			Working.	Silent.			Working.	Silent.
	Working.	Silent.	Working.	Silent.	Working.	Silent.	Working.	Silent.	Working.	Silent.	Working.	Silent.	Working.	Silent.	Working.	Silent.	Working.	Silent.	Working.	Silent.	Working.	Silent.	Working.	Silent.	Working.	Silent.		
EASTERN :—																												
Busoga	20	15	334 <i>b</i>	101	...	16	10	21	13	3	17	1	15	8	6	8	6	1	15	8	1	1	15	8	6	1	1	
Budama	4	3	66	23 <i>c</i>	2	9	4	1	6	...	4	1	1	1	4	1	1	1	1	1	1	1	1	1	1	1	1	
Bugwere	9	4	138	19	5	12	2	9	10	...	9	...	6	2	2	2	2	...	6	1	...	2	2	2	2	2	2	
Bugishu	2	2	26	11	...	4	2	2	...	...	2	...	2	...	...	...	...	...	2	...	...	...	...	...	...	...	...	
Teso ...	15	10	202 <i>b</i>	82	6	7	9	15	10	2	14	3	5	5	1	1	1	3	5	5	...	2	...	...	10	3	3	
TOTAL	50	34	766	236	13	48	24	51	39	5	46	7	29	16	11	11	12	13	29	16	11	12	12	13	13	5	5	
BUGANDA :—																												
Mengo	29	16 <i>a</i>	484	157	2	3	16	30	12	1	28	4	18	10	8	8	2	18	10	8	...	2	...	...	4	4	4	
Entebbe	8	3	155	38	...	...	3	9	3	...	8	...	9	3	...	...	3	9	9	3	...	...	...	...	...	...	...	
Masaka	6	1	101	38	...	2	3	7	2	...	6	1	7	4	...	...	4	7	7	4	...	...	...	...	...	...	...	
Mubende	9	4	90 <i>b</i>	31	...	3	3	9	4	3	5	...	9	3	...	...	...	9	9	3	...	1	...	...	...	...	...	
TOTAL	52	27	780	264	2	8	25	55	21	4	47	5	48	20	8	8	5	48	20	8	...	3	...	...	4	4	4	
NORTHERN :—																												
Lango	10	7	144 <i>b</i>	42	5	8	4	11	6	1	9	2	9	5	1	1	2	9	9	5	1	2	...	3	...	...	...	
Bunyoro	2	3	22	26 <i>c</i>	1	...	2	4	1	...	2	2	2	2	...	...	2	2	2	2	...	1	...	...	...	...	...	
Gulu	4	...	43	...	...	...	...	4	...	2	2	...	4	...	...	...	...	4	4	...	...	...	...	...	...	...	...	
Chua	2	...	21	...	1	...	...	2	...	...	2	...	2	...	...	...	...	2	2	...	...	...	...	...	...	...	...	
West Nile	1	...	10 <i>b</i>	...	...	...	...	1	...	...	1	...	1	...	...	...	...	1	1	...	...	...	...	...	...	...	...	
TOTAL	19	10	240	68	7	8	6	20	7	3	16	4	18	7	1	1	4	18	7	1	3	3	3	3	...	...	...	
WESTERN :—																												
Toto	1	...	6	...	...	...	...	1	...	...	...	...	1	...	...	...	...	1	1	...	...	...	...	...	...	...	...	
Ankole	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
TOTAL	1	1	6	...	...	1	...	1	...	...	...	...	1	...	...	...	...	1	1	...	...	...	...	...	...	...	...	
GRAND TOTAL	122	72	1,792	568	22	65	55	127	67	12	109	16	91	44	20	20	18	91	44	20	18	20	20	20	9	9	9	
	194		2,360		87		182		79		125		135		38										29	29	29	

^a Includes one licensed but silent.
^b Includes double roller gins : Busoga 7, Teso 12, Lango 20, Mubende 4, West Nile 10.
^c Includes double roller gins : Budama 1, Bunyoro 6.

**List of Circulars obtainable from the Director of Agriculture,
Entebbe:**

3. DISEASES OF *HEVEA BRASILIENSIS* IN UGANDA
4. DIEBACK OF *COFFEA ARABICA* IN UGANDA.
7. REPORT ON COFFEE CULTIVATION IN UGANDA
14. *COFFEA ROBUSTA* IN UGANDA.
15. CULTIVATION AND PREPARATION OF *COFFEA ROBUSTA*
16. COTTON EXPERIMENTS 1925—1926.
17. (A) THE OCCURRENCE OF ANGULAR LEAF-SPOT OF COTTON
IN UGANDA.
(B) ROT OF *HEVEA CORTEX* IN UGANDA.
19. SUGAR CANE IN UGANDA.
20. NOTES ON THE CULTIVATION, CURING AND PACKING OF
FIRE-CURED TOBACCO.
21. SOIL MANAGEMENT AND MANURING.

UGANDA COTTON PRODUCTION GRAPH BASED ON REPORTS RECEIVED



Yearly Exports in Bales of 400 lbs. Net.

Average Production in 5 year Periods, ending with 1932

Reproduced by the
C. S. A. Meteorological Service.

Isohyets —————
The figures represent Inches
of Rain.

Isohyets —————
The figures represent Inches
of Rain

